June 3, 1946

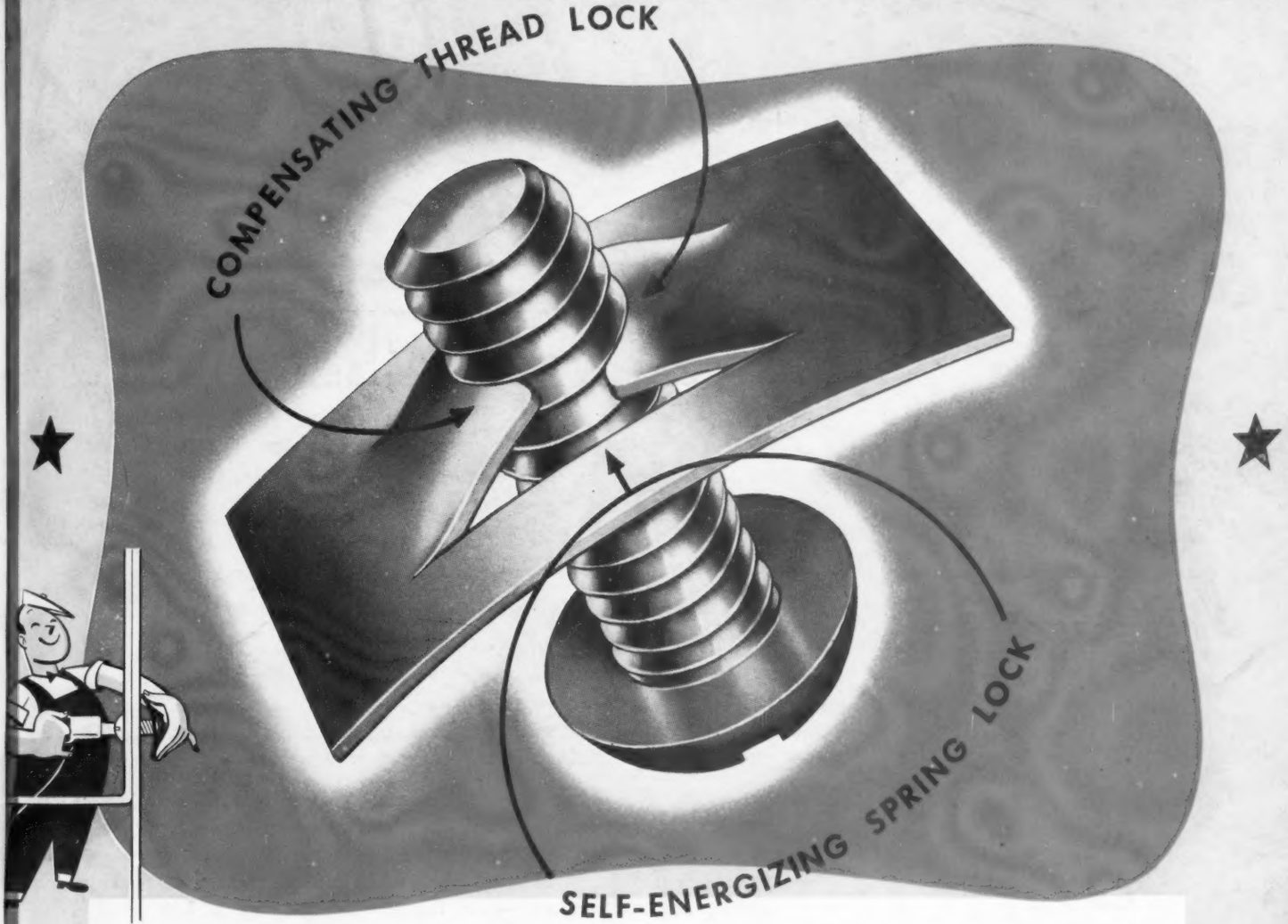
# STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 67


## NOTHING LOCKS LIKE A SPEED NUT




• As the SPEED NUT is tightened, TWO distinct forces are exerted on the screw. First, a compensating thread lock with the two arched prongs moving inward to lock against the root of the screw thread. These free-acting prongs fit oversize or undersize threads. • Second, a self-energizing spring-lock, created by the compression of the arch in both the prongs and base. The combined forces of the thread-lock and spring-lock prevent vibration loosening.

• The basic SPEED NUT principle has been engineered into more than 3,000 shapes and sizes. Whether you assemble metal, plastic, wood, glass or porcelain parts there is a SPEED NUT to fit your needs — to reduce your assembly costs, stop vibration loosening, save space and weight and improve the quality of your product. In writing for samples kindly give details of application.

**TINNERMAN PRODUCTS, INC.**
2039 FULTON ROAD, CLEVELAND 13, OHIO

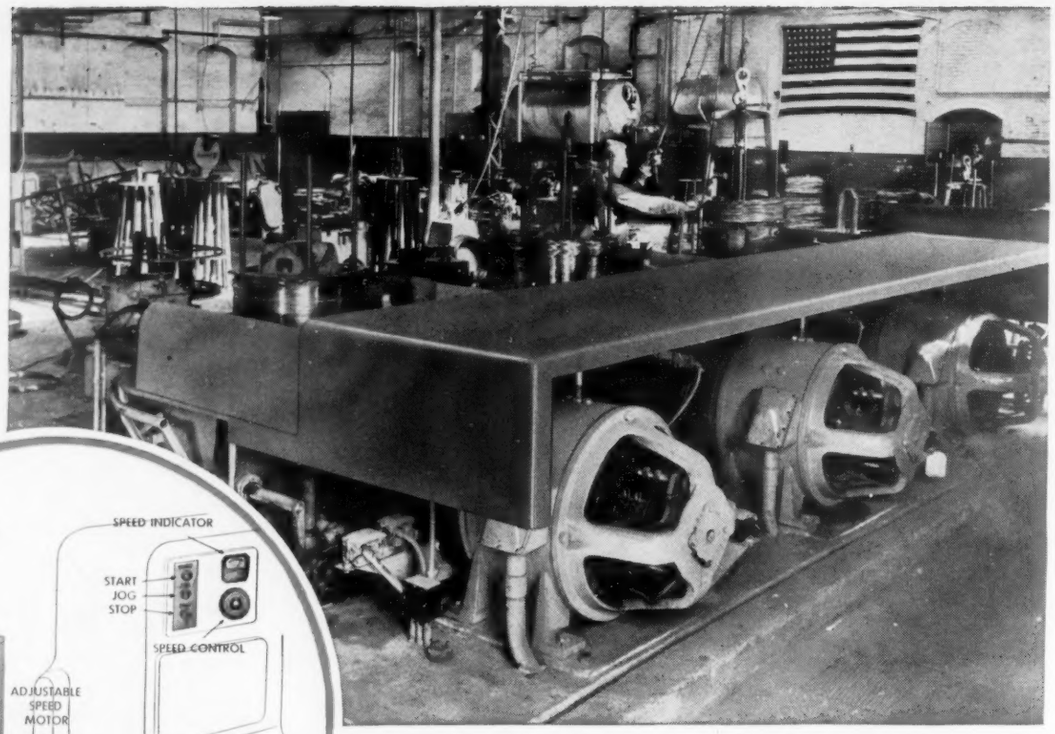
Speed Nuts
PATENTED * Trade Mark Reg. U. S. Pat. Off.

Wallace Barnes Co., Ltd., Hamilton, Ontario
Simmonds Aerocessories, Ltd., London

In France: Aerocessoires Simmonds, S. A., Paris
In Australia: Simmonds Aerocessories, Pty. Ltd., Melbourne

FASTEST THING IN FASTENINGS

# SPOT CONVERSION



*Conveniently-packaged, space-saving V★S Drives are available in either Rotating or Electronic Systems or a combination of both systems.*

## RELIANCE V★S DRIVE SAVES MONEY *by spot conversion of A-c. Power for Adjustable-Speeds*

V★S, the *All-electric, Adjustable-speed Drive operating from A-c. Circuits,* saves money in every plant it enters. Through spot conversion of A-c. power to provide adjustable-speed, it supplies an unlimited range of stepless speed changes. And does it without the expense of alterations in the plant power layout!

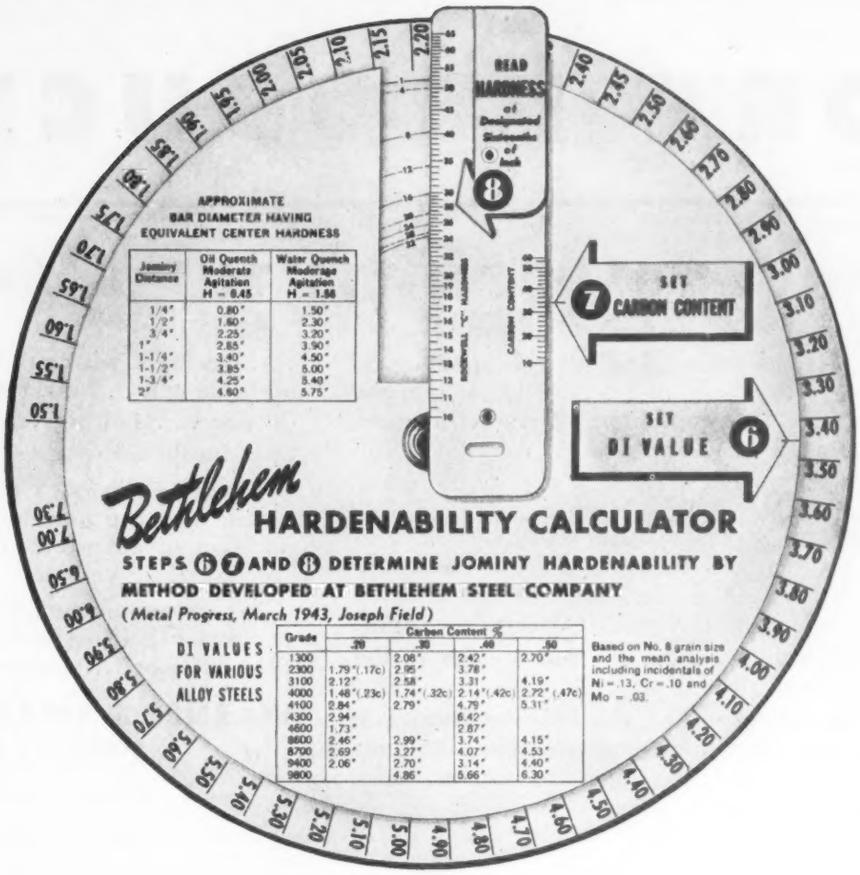
Other V★S features, such as starting, stopping and reversing by automatic or manual control from nearby or remote stations, plus the ability to maintain proper tension, are also helping to step up quantity and quality of production, while bringing costs down. Write today for Bulletin 311 — the money-saving story of V★S Drive.

RELIANCE V★S DRIVE

**RELIANCE ELECTRIC & ENGINEERING CO.**
**1081 Ivanhoe Road • Cleveland 10, Ohio**

Birmingham • Boston • Buffalo • Chicago • Cincinnati • Denver • Detroit • Gary • Greenville • Houston
Kalamazoo • Kansas City • Knoxville • Los Angeles • Milwaukee • Minneapolis • New Orleans
New York • Philadelphia • Pittsburgh • Portland, Ore. • Rockford, Ill. • St. Louis • San Francisco
Seattle • Syracuse • Tampa • Tulsa • Washington, D. C.

**RELIANCE A-C D-C MOTORS** *"Motor-Drive is More Than Power"*


READ HARDNESS at Desired Point
8
SET CARBON CONTENT
7
SET DI VALUE
6
APPROXIMATE BAR DIAMETER HAVING EQUIVALENT CENTER HARDNESS
Jominy Distance
Oil Quench Moderate Agitation H = 0.45
Water Quench Moderate Agitation H = 1.56
1/4" 0.80" 1.50"
1/2" 1.60" 2.30"
3/4" 2.25" 3.20"
1" 2.85" 3.90"
1-1/4" 3.40" 4.50"
1-1/2" 3.85" 5.00"
1-3/4" 4.25" 5.40"
2" 4.60" 5.75"
Bethlehem
HARDENABILITY CALCULATOR
STEPS 6 7 AND 8 DETERMINE JOMINY HARDENABILITY BY METHOD DEVELOPED AT BETHLEHEM STEEL COMPANY
(Metal Progress, March 1943, Joseph Field)
DI VALUES FOR VARIOUS ALLOY STEELS
Grade
Carbon Content %
.20
.30
.40
.50
1300 2.08" 2.42" 2.70"
2300 1.79"(.17c) 2.95" 3.78"
3100 2.12" 2.58" 3.31" 4.19"
4000 1.48"(.23c) 1.74"(.32c) 2.14"(.42c) 2.72"(.47c)
4100 2.84" 2.79" 4.79" 5.31"
4300 2.94" 6.42"
4600 1.73" 2.87"
8600 2.46" 2.99" 3.74" 4.15"
8700 2.69" 3.27" 4.07" 4.53"
9400 2.06" 2.70" 3.14" 4.40"
9800 4.86" 5.66" 6.30"
Based on No. 8 grain size and the mean analysis including incidentals of Ni = .13, Cr = .10 and Mo = .03.

# A HARDENABILITY CALCULATOR

## ...that's almost human

*Better* than human in many respects, for it figures the answers with almost uncanny speed and accuracy. You'll find that it makes a minute do the work of ten.

This convenient, durable calculator is based on an earlier computer devised by Bethlehem metallurgists to save their time in the hundreds of hardenability calculations they have to make every day. The present calculator is similar in principle to the original one, but with refinements and improvements in detail. It facilitates the calculation of Jominy hardenability from chemical composition and grain size; or, in reverse, the chemistry essential to meet a desired hardness.

Here's one example: Suppose you're to work with a bar 2¼ inches in diameter. You know that .40 carbon steel is essential and that a moderately agitated oil quench is indicated. You are shooting for a minimum Rockwell C 41 at the center of the bar. What analysis or analyses will do the job?

Using the calculator, you set a slide, turn a dial, take a reading—then refer to the tables for DI values. Your answer: Grade 4140, 4340, 8740, or 9840.

As easy as that. And it's only one of the ways you can use this ingenious calculator. Once you've tried it, you'll always want it at hand for reference purposes.

***FREE!*** If you are a metallurgist whose work involves Jominy calculations, you can secure one of these time-saving, durable calculators, free of charge. Simply write on your company letterhead to Bethlehem Steel Company, Bethlehem, Pennsylvania, giving your name, address, and position.

BETHLEHEM STEEL

# MORE PRODUCTION

## HOW TO GET IT IS THE *Question*

With labor and material costs rising, industry agrees that increased production is the one solution to the problem of maintaining an adequate profit margin.

But how can out-put be stepped up? Most manufacturers employ operators whose skill and long experience insure maximum volume from their present machines. The possibility of increased production through greater manual effort of these workers is slight.

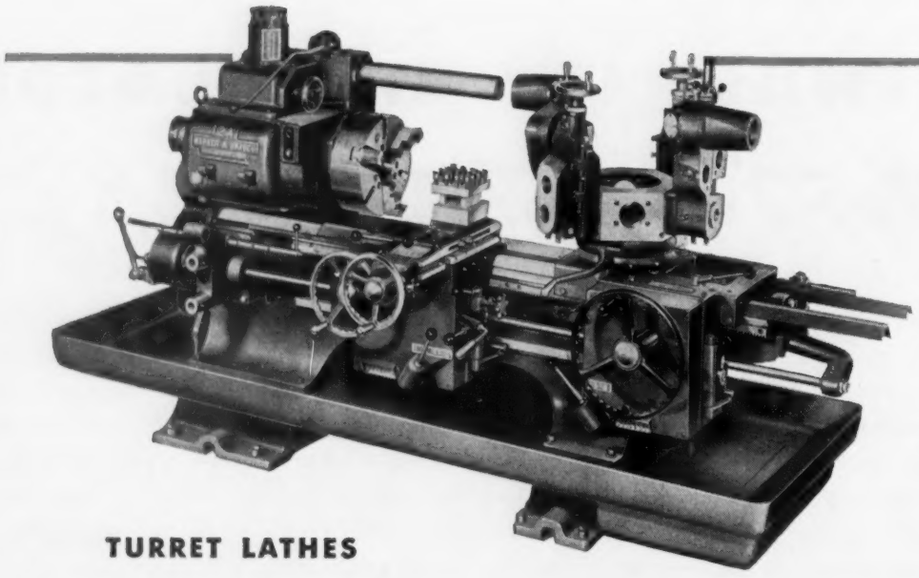
Obviously, then, the answer lies in the machines themselves.

To help you find this answer, Warner & Swasey offers new, improved machine tools . . . machines with more power for heavier multiple cuts . . . greater speed for fast production . . . and higher accuracy to produce finer finishes.

Warner & Swasey's field service can also aid in devising new tooling set-ups or the addition of accessories on old machines to increase their volume.

Whatever your problem, call for a Warner & Swasey field engineer from our nearest field office or write direct to

**WARNER & SWASEY COMPANY**
CLEVELAND 3, OHIO



**TURRET LATHES**

New Warner & Swasey Turret Lathes bring you many design improvements for increased production at low cost. Their extreme accuracy permits precision turning at high speeds. Their rugged construction makes possible heavier combined and multiple cuts. Ease of operation and control increases efficiency of the operator by cutting down fatigue.

**RAM TYPES**

No. 1 Electric, Bar Capacity, 5/8"—Swing, 11"
No. 2 Electric, Bar Capacity, 1"—Swing, 14"
No. 2 Six Speed, Bar Capacity, 1"—Swing, 14"
No. 3 Universal, Bar Capacity, 1½"—Swing, 15⅜"
No. 4 Universal, Bar Capacity, 2"—Swing, 18⅛"
No. 5 Universal, Bar Capacity, 2½"—Swing, 20"

**SADDLE TYPES**

1A Universal Heavy Duty, Bar Capacity, 2½" or 3"—Swing, 16¼"
2A Universal Heavy Duty, Bar Capacity, 3½"—Swing, 20"
3A Universal Heavy Duty, Bar Capacity, 4½" or 6"—Swing, 23½"
4A Universal Heavy Duty, Bar Capacity, 8", 9" or 12"—Swing, 28¼"

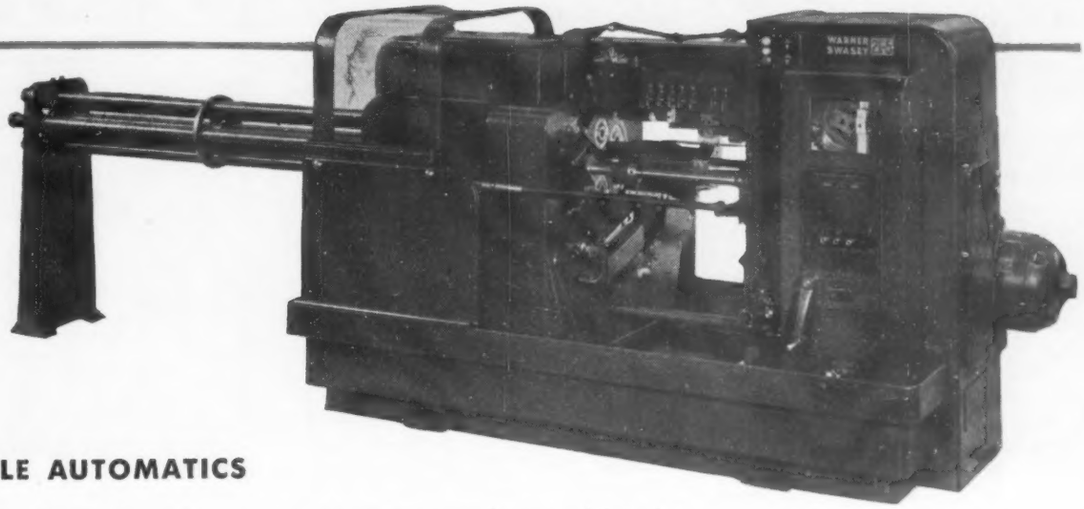
*You can machine it better, faster for less. . . .*

# ...IS THE *Answer* ...

**2 MODELS**

5-Spindle Bar Machine, 1¾" Bar Capacity (Can be furnished on order with oversize spindles to handle light work up to 2¼")

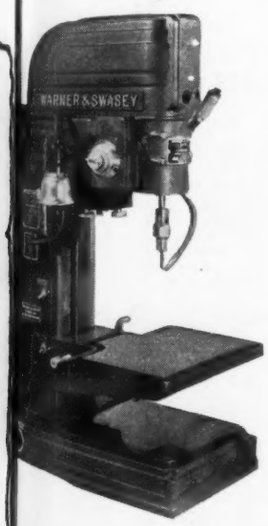
5-Spindle Chucking Machine, 6" Swing



## MULTIPLE SPINDLE AUTOMATICS

Cam changes are completely eliminated on the new Warner & Swasey Bar and Chucking Automatics. New set-ups are made quickly and easily by the patented Quick-Set mechanism, making short runs, as well as medium and big lots, practical and profitable.

Investigation of these new Automatics may show that their use in your shop will result in higher volume at lower cost.



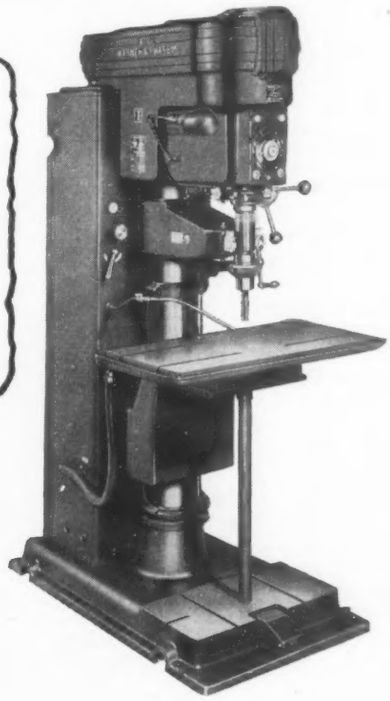

**4 MODELS**

No. 10 (Bench Model) Capacity No. 0-80 to 10-24

No. 11 Capacity No. 8-36 to ⅞"

No. 11R-Radial—Capacity No. 8-36 to ⅞"

No. 12 Capacity ⅜" to 2½"



## PRECISION TAPPING AND THREADING MACHINES

Development of a radically new lead screw principle makes these new Warner & Swasey Tapping and Threading Machines production leaders. Elimination of backlash permits accurate threading of 3, 4 and 5 gauge fits on a production basis.

Users of these new machines tell of substantial volume increases at lower cost due to greater accuracy and elimination of tap-breakage and rejects.

WARNER & SWASEY
Machine Tools
*Cleveland*

*.....with a Warner & Swasey*

# Behind the Scenes...

## One World—One STEEL

Those cows of ours certainly do get around. We have had reports from various sections of the country and we were aware that many people here were puzzling over the proper direction in which it should be held so that Bossy's physiognomy comes busting out, plain as day. However, we were somewhat bowled over the other day to get a postal card from our boss, E. L. Shaner, who is now in Tokio with the International Reparations Commission, studying the steel industry in Japan and its former satellite territories. He says that in MacArthur's headquarters he ran across several people who were trying to solve the cow problem, and were quite grateful to him for showing them the proper way to look at it. People everywhere, it seems, look to STEEL for up-to-date information on American industry. Just like that Russian who was thirsting after knowledge on page 92 of our May 20 issue. That photo showing Comrade Panteleimon Lozovoy reading this magazine in a Siberian steel plant came through regular Sovfoto channels, and was not solicited by our promotion department, other indications to the contrary notwithstanding. Round-the-world readership is ours!

## We're A Big Family

According to C. E. Beveridge of the Utah Railway Co., who describes himself as a "third-hand reader of STEEL", we have been popping up in out of the way places. To prove his point, he sends us a tear sheet from the American Railway Engineering Assn. News which has an item about a Southern Railway shrdlu shrdlu shrdlu. That's a cousin, son.

## Typo

From up Michigan way comes a note which points out that we have created a new spelling for "opportunity", with only one p. F. S. Collins of Franklin Products Co. accuses us of going to simplified spelling on our own hook. However, that typo in our May 13 issue was just that. We're really quite conservative underneath our veneer of progressive thinking, and we wouldn't dream of contradicting Noah Webster intentionally. However, the linotype artists who shell out the lead for this sheet week after week are sometimes unpredictable. Perhaps one of them was feeling quite low the day he set that particular piece. Probably had been reading about the coal strike, the rail strike, the inflation and the butter shortage and decided opportunities aren't as great in this country as they used to be. This line of thought naturally caused his subconscious mind to cut down on the physical appearance of "opportunity" by leaving out that p. What we don't know is whether that was the first p or the second p which he omitted and which escaped the eagle eye of our proofreaders.

## A Look Ahead

It has been some time now since we took a peek at the future offerings of the editors. The other day we snuck up the back stairs in the hope that we might catch them off guard and be able to report that the editors didn't have anything important lined up, that they were wondering what they might write about for next week, and that confusion reigned. Not those guys. They know what they're doing, and they do it. We were bombarded with new things coming up in near-future issues. For instance, we will have some excellent basic information on welding processes for sheet metal applications. There is a good story scheduled soon on nonferrous forging. The application of shaped wire comes in for some discussion in an early issue, and also slated is a story in the use of honing for close-tolerance finishing of parts for compressors used in electric refrigerators. These are just some of the high spots. The boys have been busy gathering much more usable information, which will be dished up in their usual concise and accurate presentations. This information will save time and money for some metalworking plants. Is yours one of them?

## It's Tough All Over

Recently we ran into a friend of ours who peddles industrial oils. He was feeling rather pessimistic about the whole deal, and we asked him what seemed to be the trouble. "Well," he said, "these purchasing agents all have good, sound reasons why they don't want to give me any orders. If they aren't worried about the coal strike shutting the plant down, they are worried about the railroads not shipping their product. Or else they are facing a strike in their own plant, or perhaps their chief customer is strikebound. If that's not the case, they're tangled with the OPA ceilings and can't produce at a profit. If all these things are in the clear, then they can't get material—and one guy I saw today has none of those problems. He just has such a big stock of our stuff left over from war production that he won't need any more for a year or so."

Ain't it the truth?

Shrdlu

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STEEL

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*Editorial Staff on Contents Page*

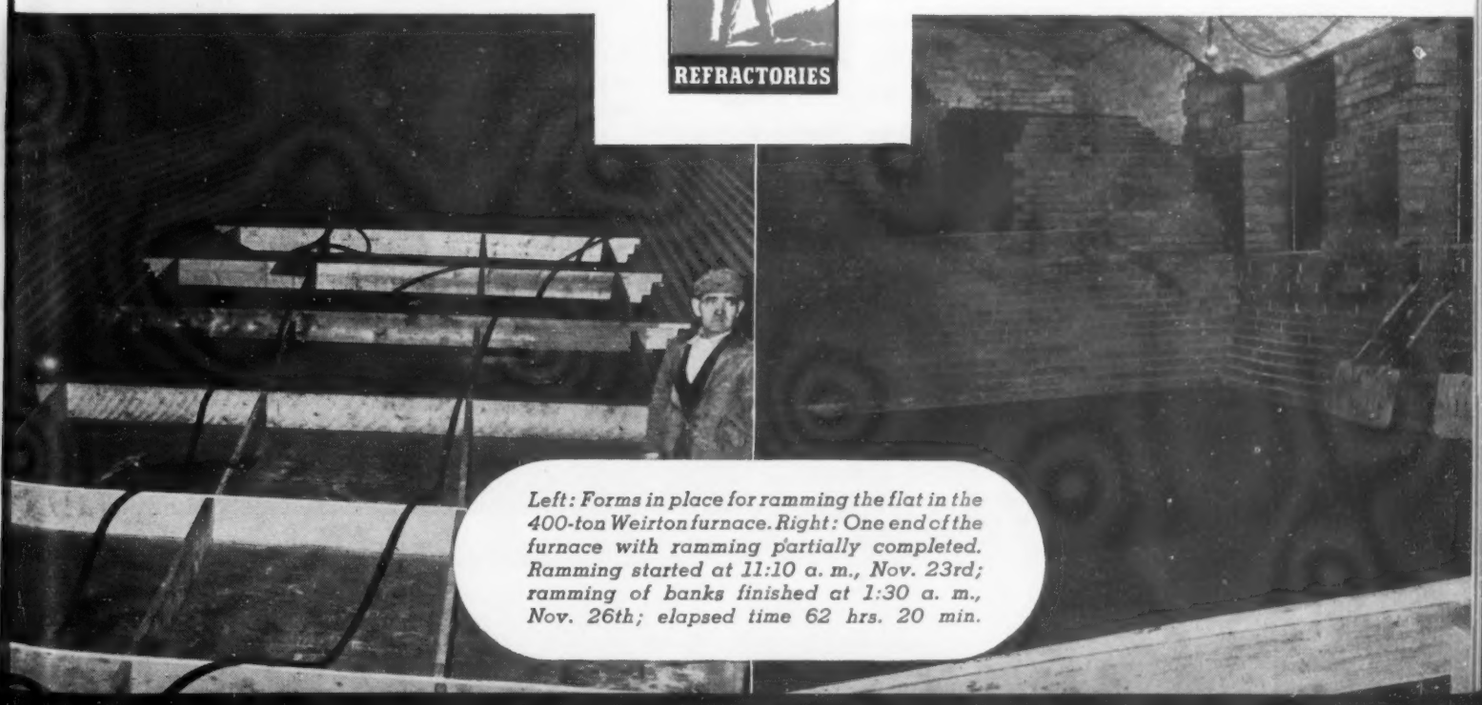
# World's largest open hearth gets a RAMIX bottom

THIS All-Ramix hearth was installed in one of Weirton Steel Company's 400-ton open hearth furnaces last November. 124 heats had been tapped from it on April 1st, and as with all the other Ramix installations at Weirton, this bottom is in excellent condition.

Where it would have required 12 to 14 days to burn in a conventional magnesite hearth, this Ramix job took only 144 hours, from the start of cold ramming to the charging of the hot furnace, with hearth fully matured and slagged. Two shifts of three rammers each operated air hammers, without interruption, for 62⅓ hours, to ram the 156½ tons of Ramix required. The refractory was mixed in a cement mixer and a complete set of forms was used.

This was the seventh Ramix hearth put in at Weirton—one of over 300 in the open hearth industry—many installed under the personal supervision of Basic Engineers. Success with cold rammed hearths at Weirton, as at 144 other open hearth and electric shops, is the result of three important factors: (1) use of the right material; (2) correct installation procedure, and (3) good maintenance practice.

The services of Basic Refractories Engineers are available to any steel company, for advice and help on refractory problems. BASIC REFRACTORIES, INCORPORATED, 845 Hanna Building, Cleveland 15, Ohio. *Exclusive Agents in Canada:* Refractories Engineering and Supplies, Limited, Hamilton and Montreal.



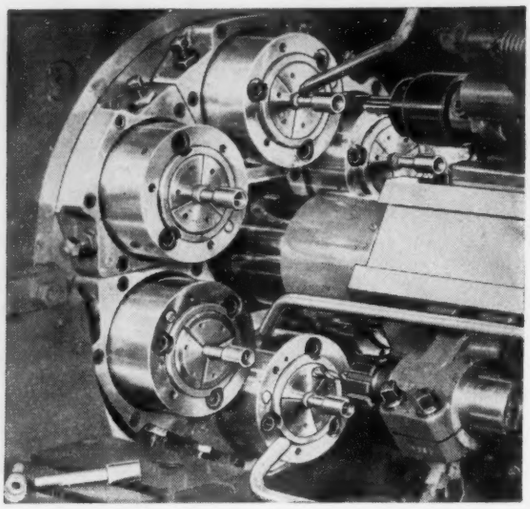
*Left: Forms in place for ramming the flat in the 400-ton Weirton furnace. Right: One end of the furnace with ramming partially completed. Ramming started at 11:10 a. m., Nov. 23rd; ramming of banks finished at 1:30 a. m., Nov. 26th; elapsed time 62 hrs. 20 min.*

# LEADERSHIP BASED ON ACCOMPLISHED FACTS

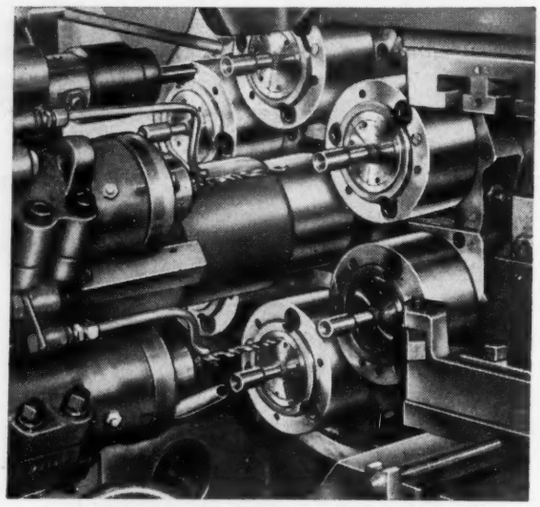
This will interest you if your work involves small accurate parts. In tooling and equipping our Model 65 Six Spindle Automatic Chucking Machines for the requirements of the Moeller Instrument Company, Richmond Hill, New York, provision was made for handling a variety of sizes of similar parts in various metals including steel, nickel copper alloy, and naval brass forgings.

The piece illustrated is a 3⅝" long tapered steel part, ¾" diameter on the large end, calling for drilling to a depth of 3½". It is held by specially designed collets, each with an extra long bearing, for drilling a deep hole leaving a thin wall. Six operations are performed at a gross production rate of 187 pieces per hour. Not a dramatically difficult assignment but a good illustration of the adaptability of New Britains to a wide range of applications . . . and another instance of high production at low cost per piece.

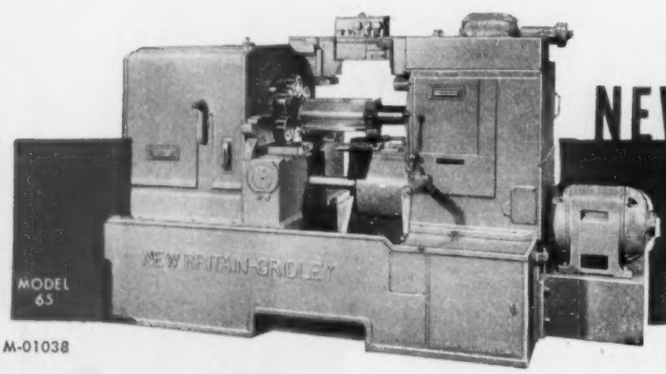
Many do not realize the wide range of practical applications for multiple spindle automatic screw and chucking machines. Our sales engineers do, and offer you a competent engineering service you may profit by investigating.



FRONT VIEW — New Britains are built to allow easy accessibility for simplified chucking, cutting tool and attachment setup.



REAR VIEW — New Britain construction provides extra large chip space . . . lots of room from all sides giving excellent visibility and easy tool adjustment.

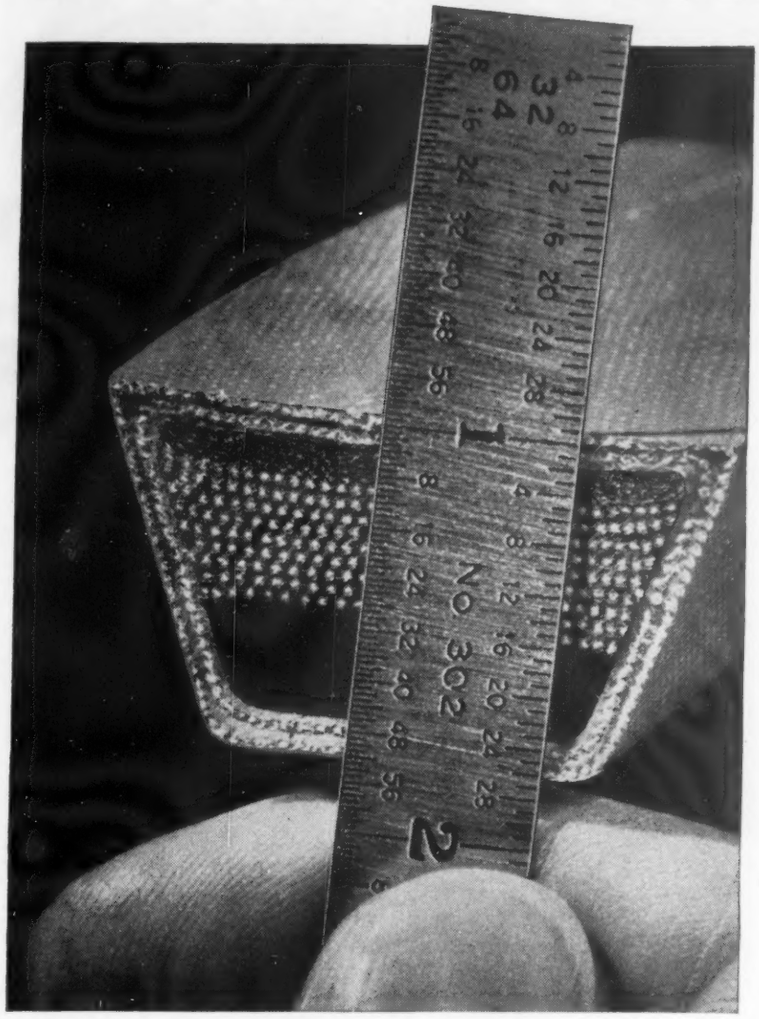



M-01038

## NEW BRITAIN AUTOMATICS

**THE NEW BRITAIN MACHINE COMPANY**
NEW BRITAIN, CONNECTICUT
New Britain-Gridley Machine Division

# BALANCED CONSTRUCTION



## Makes TEXROPE V-BELTS Run Cooler... Smoother...Longer

Look at this cross-section of a TEXROPE Super-7 V-Belt. This balance between rubber, cord and fabric — the weight of cover — position of load carrying cords — thickness of cushion — width and depth of belt — have been carefully engineered. They've been proved on the machines of American industry through 20 years of successful operation.

This long experience has developed other advantages, too: *50% Stronger Cords,* of long staple hard-twisted cotton — *Tough Duplex Cover* to take the wear, seal out dirt and grit — *Thick Cushion* of cool-running improved Buna-S to protect the cord structure from shock.

**YOUR V-BELT DRIVE HEADQUARTERS**

Call your Allis-Chalmers office or dealer for TEXROPE Super-7 V-Belts — for full range of standard, "Magic-Grip" and Vari-Pitch sheaves — for Speed Changers and complete V-Belt Drive engineering help. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

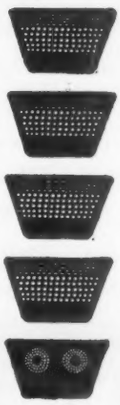
A 2034

**HEAR THE BOSTON "POPS":**
*Every Saturday Evening, American Broadcasting Co.*

### WHICH TEXROPE Super-7 DO YOU NEED?

Pick the right TEXROPE Super-7 V-Belt — it'll give you the most in efficient power transmission and economy.

TEXROPE Super-7 V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich — and are sold exclusively by A-C.



**Heat-Resisting Super-7**
Stands temperatures up to 180°. The TEXROPE V-Belt for most drives.

**Oil-Resisting Super-7**
Neoprene cover protects core against moderately oily or greasy conditions.

**Oil-Proof Super-7**
Made of Neoprene throughout. Use it when the belt must swim in oil.

**Static-Resisting Super-7**
Recommended where explosion hazard exists. Static-conducting element throughout cover won't wear off.

**Super-7 Steel**
Twin steel cables, to pull extremely heavy loads with minimum stretch.

GET THEM — through your Allis-Chalmers district office or dealer.

## ALLIS CHALMERS TEXROPE V-BELT DRIVES

# Don't leave it to chance

IN CHUCK-A-LUCK — the odds are 215 to 1 against three of a kind; 13.4 to 1 against two of a kind. Paying even money on the singles, two-for-one on the doubles, and three-for-one on triples, Chuck-A-Luck always gives a 7 47/54 percentage in favor of the "house".

## LEAVE IT TO— HY-TEST

### THE SAFETY SHOE WITH THE ANCHOR FLANGE STEEL BOX TOE

This flange adds extra strength to the steel arch's sidewall. Anchored between insole and outsole, it also serves to resist shifting and tilting when toe is struck at an angle.

Hy-Test Safety Shoes were first manufactured to give workers a big safety margin against accident odds. And new ways are always being found to increase this margin as the years go by. One of the greatest protective features to make Hy-Test an even better safey shoe is the use of the Anchor-Flange Steel Box Toe. This flange not only gives added strength but also helps keep the steel toe from tilting or shifting when it is struck at an angle. The anchorage is made by sealing the steel toe's flange between the insole and outsole. This extra safety feature, plus the sturdy leathers and fine workmanship always found in Hy-Test, provides workers with a comfortable, easy-wearing safety shoe that lasts longer and gives better protection. We will be glad to show you how easy it is to have this extra margin of safety for workers in your plant. Just drop us a line.

THE WORLD'S LARGEST SELLING SAFETY SHOE

## HY-TEST *Safety Shoes*

HY-TEST DIVISION • INTERNATIONAL SHOE COMPANY • ST. LOUIS 3, MO.
EASTERN OFFICE • MANCHESTER, N. H.

# Save Time and Material

## WITH ALLIS-CHALMERS NEW DRY-TYPE TRANSFORMERS!

☛ You save *time* because these units are up to ⅓ lighter, ⅓ smaller . . . easier to handle and install. And they're dry-type . . . have *no* insulating liquids to test, filter, or change.

☛ You save *material* because they can be mounted right at load centers . . . eliminate long runs of heavy secondary copper. And because they're light and safe, no fireproof vaults, insulating liquids, or extra mounting materials are needed.

☛ For complete details, get in touch with your nearest Allis-Chalmers dealer or sales office, or send for new bulletin B6382. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

**YOU GET OTHER BENEFITS, TOO!**

*Wider Range of Installation* — you can put them almost anywhere you need secondary power . . . to improve lighting, voltage conditions, step-up production!

*Longer Transformer Life* — because class "B" insulation resists higher temperatures and protects against moisture . . . won't shrink or stretch, rot or mildew.

*Save Money* — you can buy these new class "B" insulated transformers for same low prices as ordinary class "A" insulated units! Fourteen sizes ranging from 1½ to 300 kva are available. A 2016

Compact coils show how class "B" insulation permits 1/3 lighter, 1/3 smaller, longer-lifed transformers. Terminal board for circuit connections is sturdy, rigid.

Note ample clearance between tank sides and transformer core and coils. Although compact, these units provide sufficient space for safe, efficient ventilation.

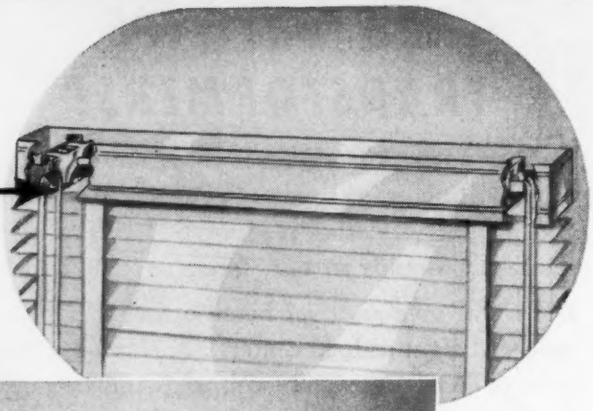
ALLIS AC CHALMERS DRY-TYPE TRANSFORMERS

RELIANCE

# JOB-FITTED STEEL

*The Invisible Mark of Quality in Your Product . . .*

FROM *Blinds* TO *Broilers*



## . . . JOB-FITTED TO YOUR PRODUCT

When Reliance Job-Fitted Steel goes into your product, it gives up its own identity but in doing so, it imparts strength, beauty, serviceability and endurance. It makes for speedy, smooth production at low cost.

# RELIANCE STEEL DIVISION

*Detroit Steel Corporation*

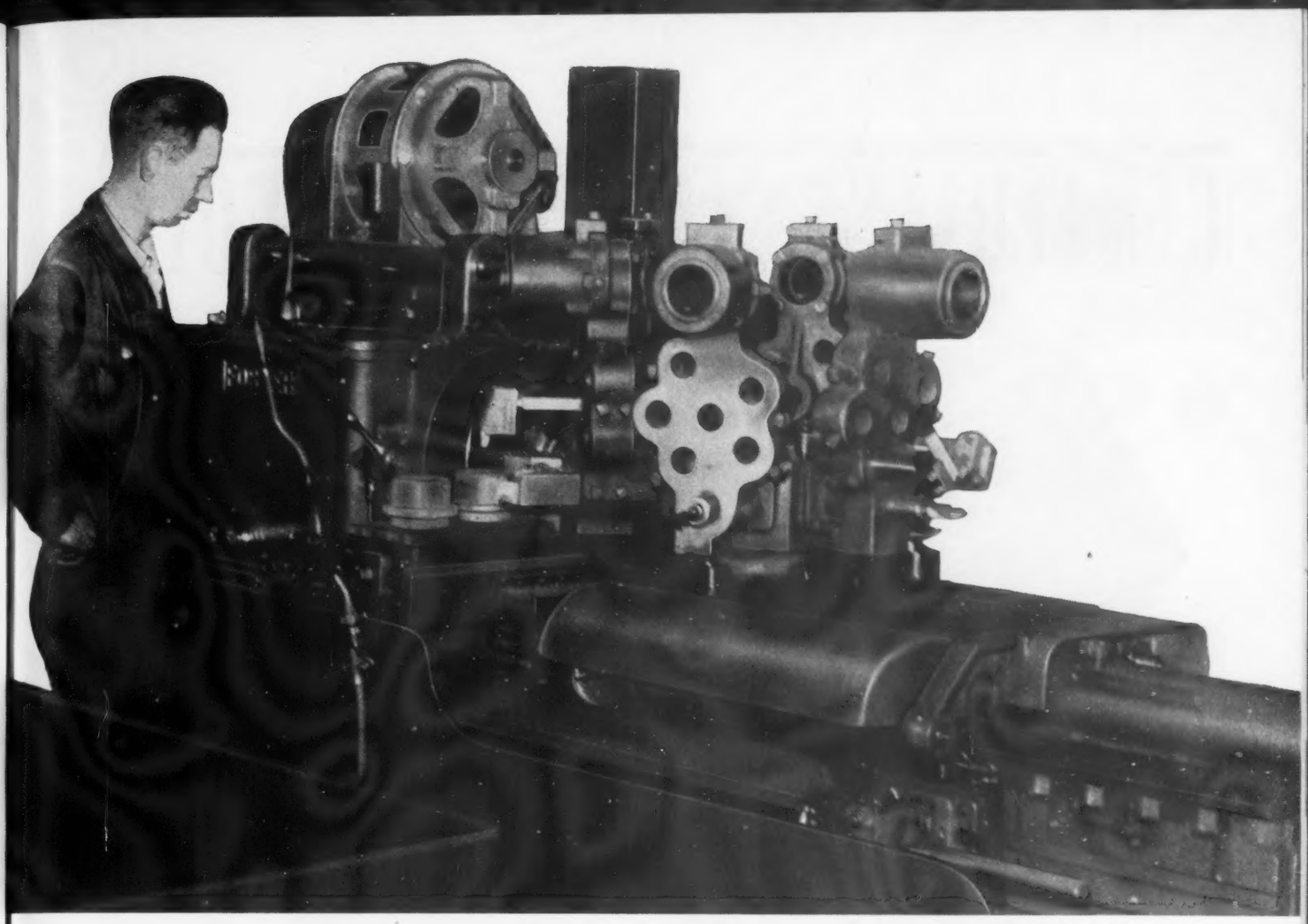
GENERAL OFFICES: 1170 IVANHOE ROAD, CLEVELAND 10, OHIO

PLANTS: CHICAGO*, CLEVELAND*, DETROIT*, LYNDHURST, N. J., WORCESTER, MASS.

SALES OFFICES: GRAND RAPIDS*, INDIANAPOLIS*, NEW HAVEN, PHILADELPHIA, ST. LOUIS, TOLEDO*

RELIANCE STEEL CORP. OF CANADA, WINDSOR, TORONTO

ALUMINUM SHEETS and STRIPS—available through locations marked*



# 2-Step Sheaves—in 8½ Minutes with the *FASTERMATIC*

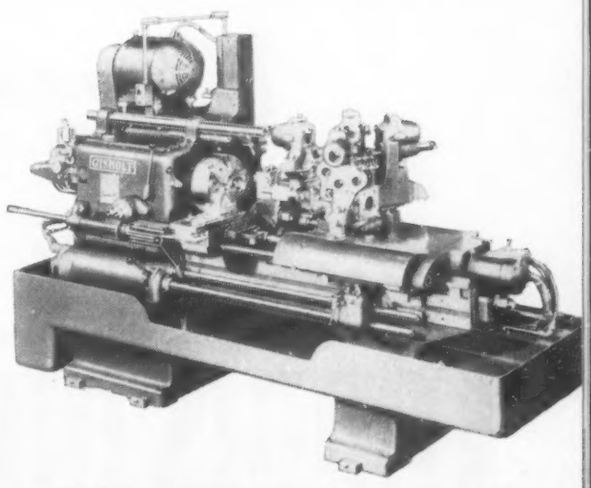
Here's a perfect example of the Fastermatic's ability to handle a large number of cutting operations in one chucking—and *fast!*

The machining of these 2-step sheaves calls for 16 different cuts. To obtain the most efficient rate for each work diameter, the machine automatically changes speeds and feeds 8 times as the turret indexes through its 6 positions. And it's *all* automatic; the operator has only to load, start the machine, and remove the finished work. Floor to floor time is 8 minutes, 30 seconds.

Naturally, production like this means rock bottom costs. Moreover, the flexibility of the Fastermatic makes it possible to handle a wide variety of work with easy setup and simple tooling. Write for literature.

**GISHOLT MACHINE COMPANY**
*1217 E. Washington Ave. • Madison 3, Wisconsin*

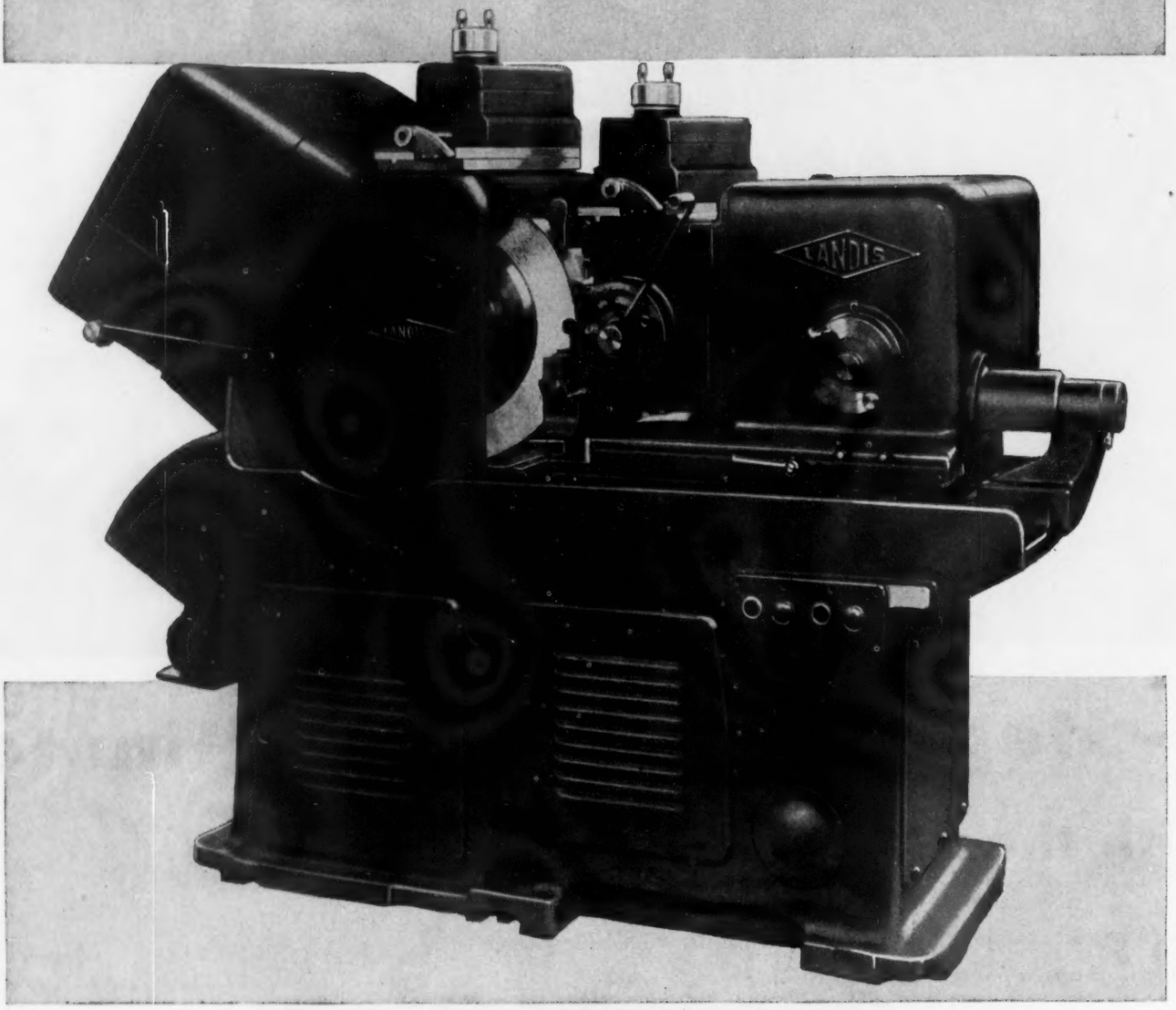
***Look Ahead . . . Keep Ahead . . . with Gisholt***



***The Fastermatics** are universal automatic turret lathes, equipped with a hydraulic feed system automatically controlled by standard feed cams. Cross slides are individually controlled and can be engaged for simultaneous operation with turret tools. Literature on request.*

**TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES**

# CENTERLESS THREAD GRINDER




*Announced in 1944*

## NOW AVAILABLE

A most desirable feature of the LANDIS Machine Company's Centerless Thread Grinder is the ability to thru-feed headless parts or plunge-cut headed work. This feature gives the machine a much wider field of application.

***Write for Particulars***

# LANDIS MACHINE COMPANY

## WAYNESBORO · PENNA · U·S·A·

# SINEWS OF STEEL

## FOR DETROIT'S INDUSTRIAL GIANT

By the carload, by tons and thousands of tons, steel from the mills of Great Lakes Steel Corporation feeds the great automotive plants that have made Detroit the Motor Capital of the world.

Here it is transformed through the miracle of modern engineering and mass-production techniques into cars, trucks and buses: A sheet of steel becomes a beautifully designed, smoothly contoured body; formed sections are welded into a sturdy, rigid frame; fenders are blanked and drawn to shape; scores of parts fabricated and heat-treated from the steels that Great Lakes produces for Detroit's own industrial "giant."

Great Lakes Steel Corporation takes great pride in its assignment as a major steel supplier to the automotive industry. On this Golden Jubilee, we join in acclaiming the vision that "put the world on wheels" . . . the vision that has provided greater value in motor cars and vehicles, year after year, since the first car drove the streets of Detroit.

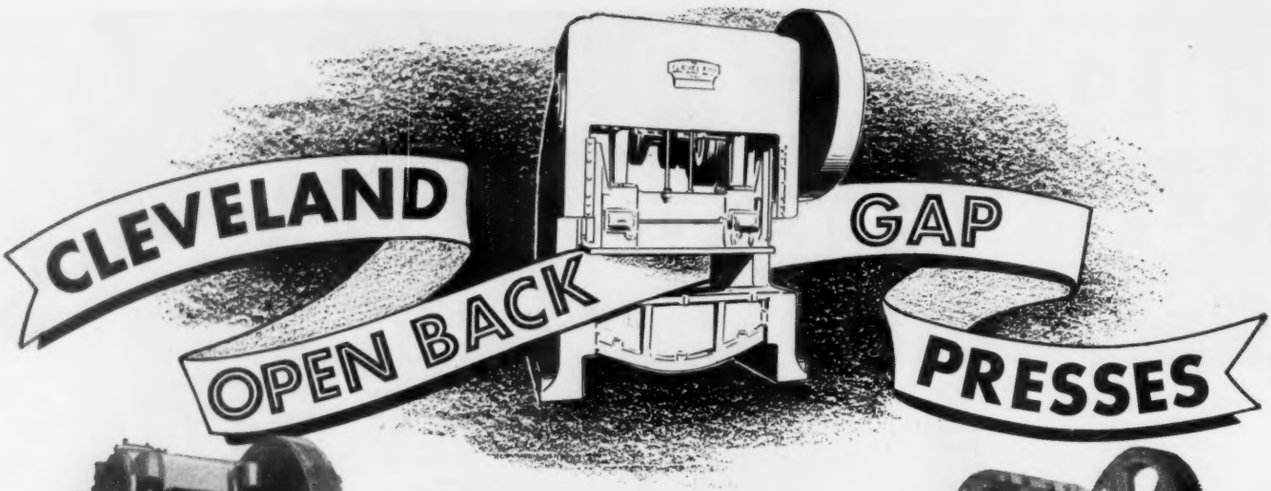
GREAT STEEL FROM GREAT LAKES

**GREAT LAKES STEEL CORPORATION**

DETROIT 18, MICHIGAN • OFFICES IN PRINCIPAL CITIES

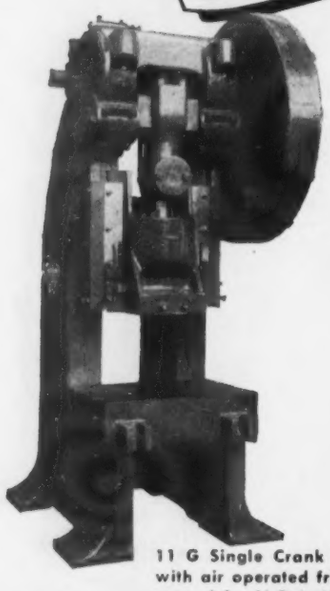
UNIT OF NATIONAL STEEL CORPORATION

# CLEVELAND OPEN BACK GAP PRESSES

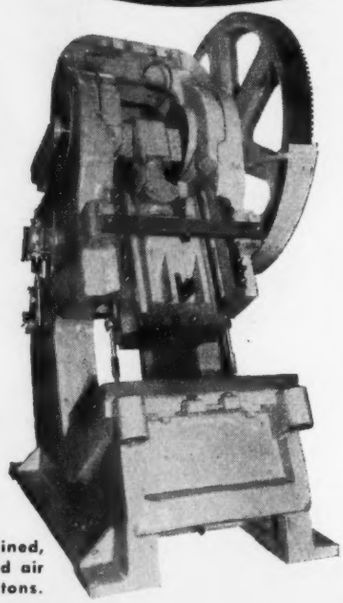


This type of Press is recommended for the convenience which the frame affords in the handling of large or irregular sheets and for feeding strip stock right and left across the dies. They are used extensively in the Automotive, Electrical, Agricultural and many other industries for punching, shearing, perforating, bending and forming operations.

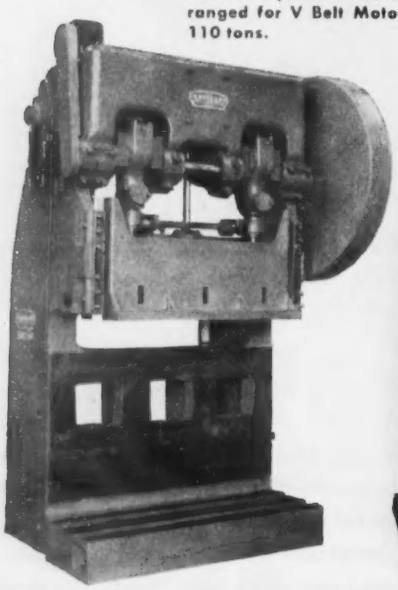
Built in wide range of standard sizes in both Single and Double Crank they can be modified in many respects to suit particular requirements.



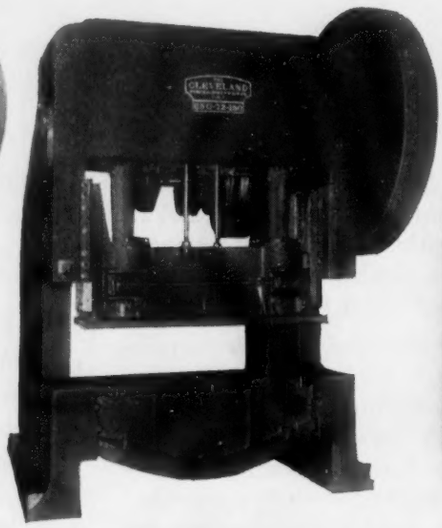
**11 G Single Crank Gap Press equipped with air operated friction clutch, and arranged for V Belt Motor Drive. Capacity 110 tons.**



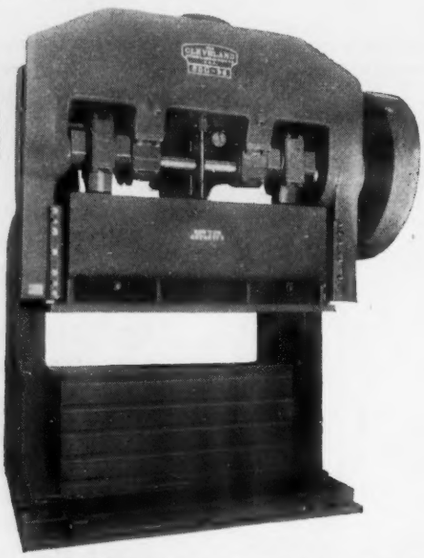
**15 G Single Crank Gap Press, inclined, equipped with electrically controlled air operated friction clutch. Capacity 215 tons.**



**50-G-54 Double Crank Gap Press, flush front, equipped with air operated friction clutch, air counterbalance, air brake on flywheel. Capacity 90 tons.**



**65-G-72 Double Crank Gap Press, equipped with electrically controlled air operated friction clutch. Capacity 150 tons.**



**80-G-96 Double Crank Gap Press, flush front, equipped with hydraulically operated friction clutch, air counterbalance. Capacity 255 tons.**

## THE CLEVELAND PUNCH & SHEAR WORKS COMPANY

*Cleveland 14, Ohio*

# Just Darn Good Blocks

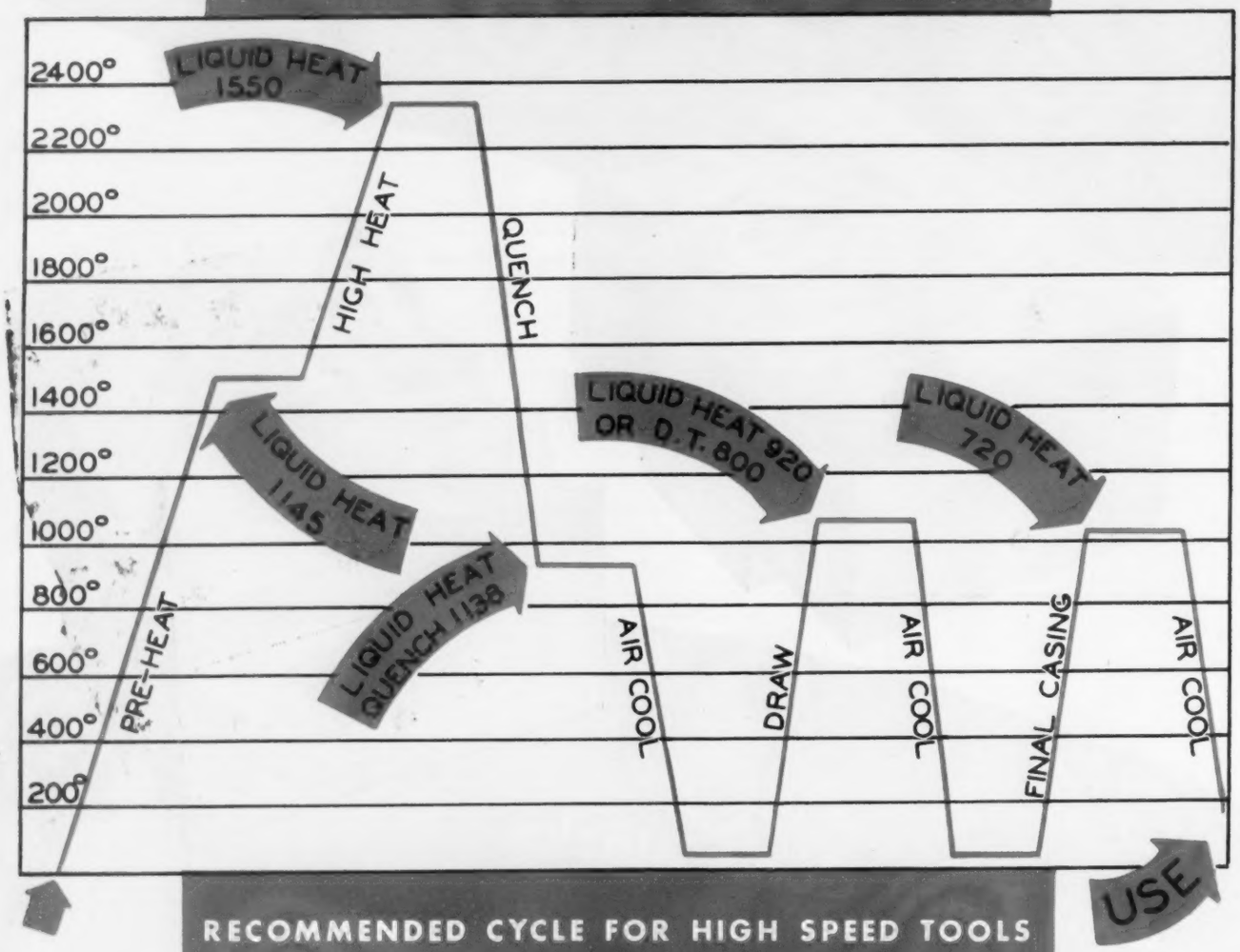
Heppenstall Die Blocks are naturally expected to give, *and do give*, a substantial margin of extra service. Heppenstall Co., Pittsburgh, Pa.

Heppenstall

the most dependable name in die blocks

# FOLLOW THE RED LINE

## FOR HIGH SPEED STEEL HEAT TREATMENT




### RECOMMENDED CYCLE FOR HIGH SPEED TOOLS

New Houghton salts developed for heat treatment of high speed steels include Liquid Heat 1145, inhibited against decarb; Liquid Heat 1550, employing immersed graphite rod for automatic rectification, and Liquid Heat Quench 1138, usable at lower temperatures than former quenching salt. To these may be added a draw, and a final casing which lengthens tool life. For leaflets or for specific recommendations, write E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia 33, Pa.

**HOUGHTON'S** *Liquid* **SALT BATHS**

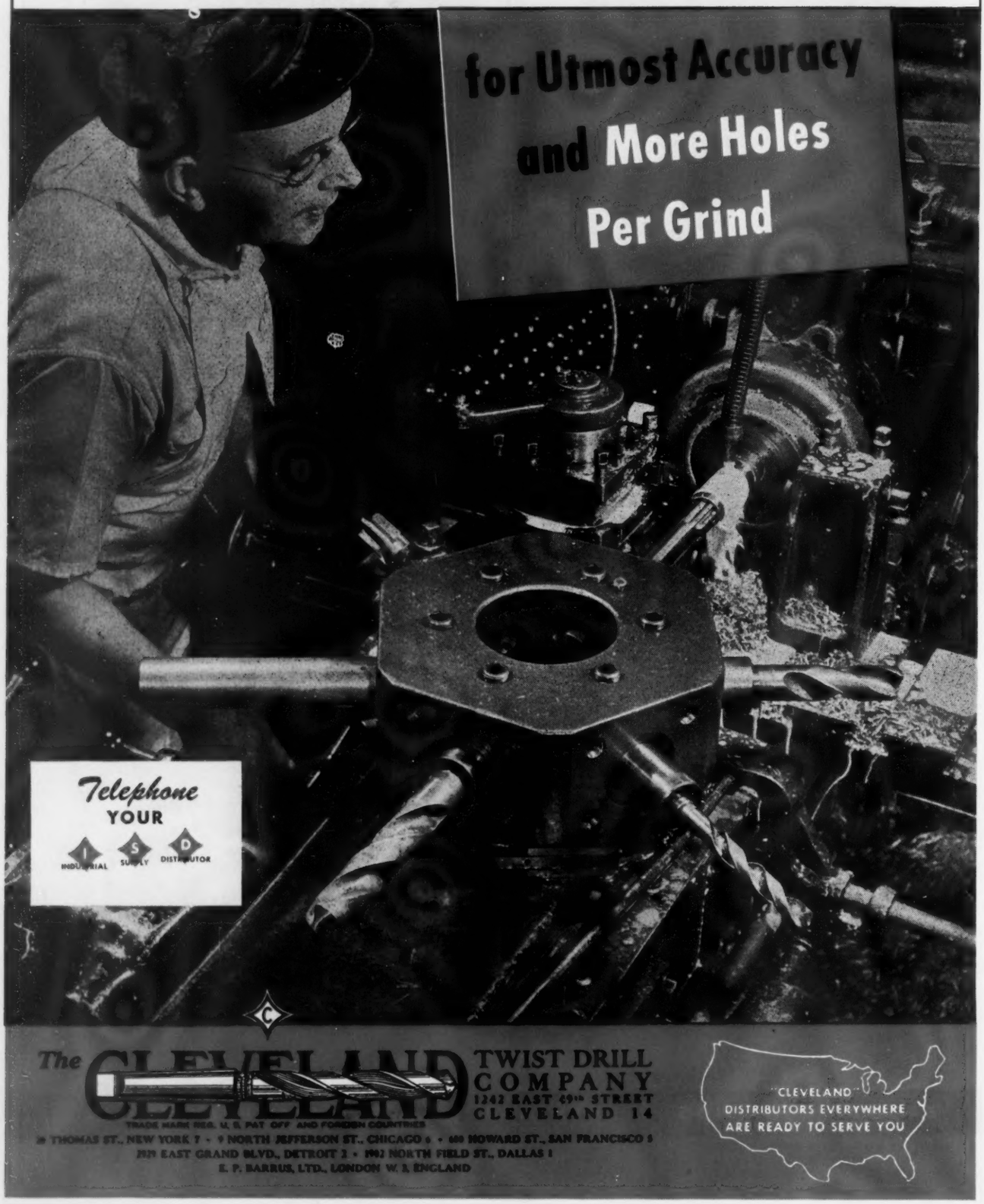
If precision is your problem, sleeve bearings will solve it to the fullest extent... In modern aircraft engines and their superchargers—on the spindles of precision machine tools—where precision is paramount—Bunting Cast Bronze sleeve bearings are used...Versatile in design and alloy, Bunting Bearings offer advantages which we would like to discuss with you. The Bunting Brass & Bronze Co., Toledo 9, Ohio. Branches in Principal Cities.

Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

42

# CLEVELAND Drills and Reamers




The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND 14

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

70 THOMAS ST., NEW YORK 7 • 9 NORTH JEFFERSON ST., CHICAGO 6 • 600 HOWARD ST., SAN FRANCISCO 5
3939 EAST GRAND BLVD., DETROIT 2 • 1902 NORTH FIELD ST., DALLAS 1
E. P. BARRUS, LTD., LONDON W. 3, ENGLAND

ONE OF A SERIES OF STORIES ABOUT ALLOYING METALS . . . WHERE THEY COME FROM AND HOW THEY ARE USED

# THE STORY OF VANADIUM

GODDESS OF BEAUTY

Vanadium compounds give beautiful colors in solution—lavender, green, deep blue, orange. That's why the Swedish scientist, Sefstrom, first to identify this metal, named it after Vanadis, the Norse goddess of beauty. That was back in 1830, but vanadium has been widely used in steelmaking only since 1900.

U.S. SELF-SUFFICIENT

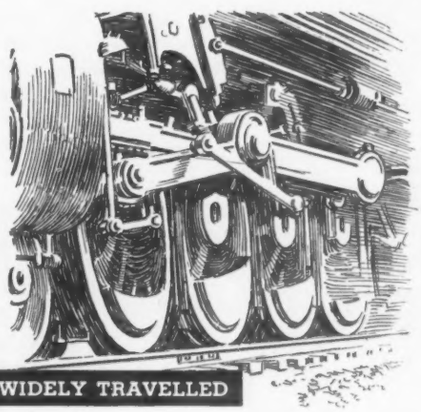
Although vanadium is one of the rarer elements, it is widely distributed in the earth's crust. Colorado is one of the chief sources of this ore—supplying much of our domestic requirements. This is one of the cutting faces of a mine of the United States Vanadium Corporation (a Unit of UCC) at Rifle, Colorado.

SUN DWELLER

With an appearance like silver and weight lighter than iron, vanadium has been found to exist on the sun. Steelmakers use it in the form of ferrovanadium, which contains 50-55 per cent vanadium. Ferrovanadium is produced from ore concentrates in several of Electro Metallurgical Company's seven plants.

LITTLE GOES A LONG WAY

Vanadium is a strong deoxidizer, but iron and steelmakers use it mainly for its alloying effect. Only 0.10 per cent—or less—is required in steel castings to refine the grain. In high-speed tool steels and chromium-vanadium steels a content of from 1 to 2 per cent vanadium imparts stability at high temperatures.



WIDELY TRAVELLED

In the railroad, shipbuilding, and automotive industries vanadium steels are extensively used for moving parts requiring high dynamic strength—such as leaf springs, rear axle gears, and heavy locomotive castings and forgings. Vanadium increases the impact strength of steel without sacrificing ductility.

## If You Use Alloys . . .

**You will want to have a copy of the booklet "Electromet Ferro-Alloys and Metals." It gives helpful information about vanadium and other alloying metals that Electromet supplies, as well as an explanation of the unique Electromet service to the iron and steel industries. This service puts at your disposal research, development, and engineering facilities to help solve your metallurgical problems. Write today to our Technical Service Department.**

**ELECTRO METALLURGICAL COMPANY**
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

**ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.**

P-19451

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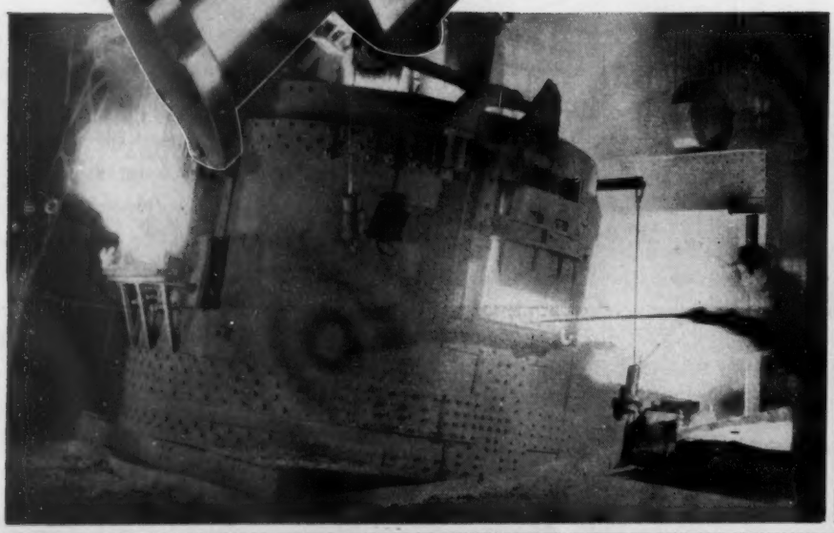
# WHAT ABOUT THE *STEEL* IN THE *FORGINGS* YOU BUY?

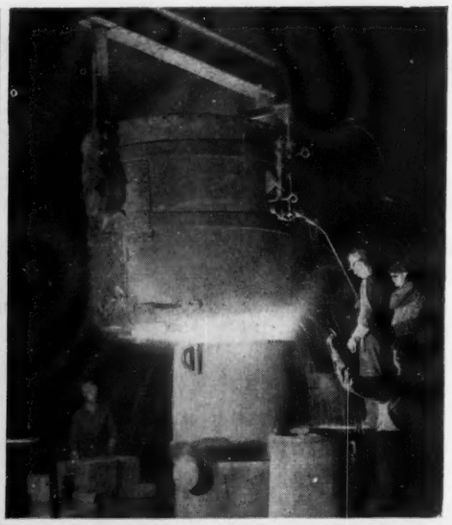
*This Diesel locomotive crankshaft requires steel of the highest quality to perform its exacting duty in railroad service.*

Every heavy duty forging has a tough job to do—that is why a forging is used. To do the job well it must possess definite prerequisites. First and foremost it must be made of high quality steel. The steel should be of clean homogeneous structure free from injurious defects and inclusions. The chemical analysis should be held within the specification limits and the grain size should be suited to the job. Do you make sure that you get this kind of clean steel in the forgings you buy?

## NATIONAL FORGE MAKES ITS OWN STEEL

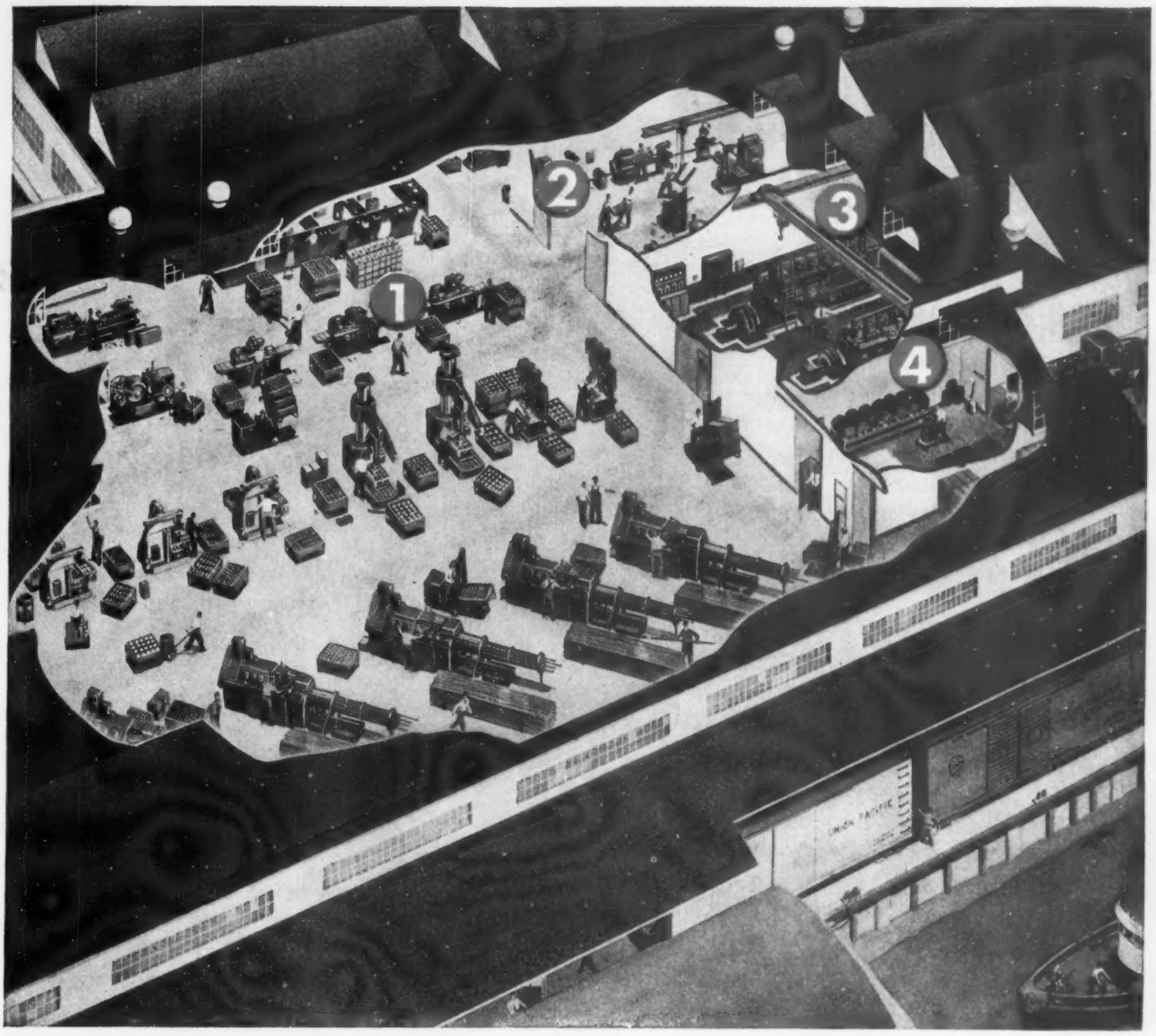
as the only way it can assume complete responsibility for the quality of the forgings it makes. At National, Heroult Basic Electric melting furnaces are used, thus producing steel with low sulphur and phosphorous contents. The grain size, abnormality and hardenability are more uniform and with close laboratory control over the steel making, high quality steel is obtained. With modern equipment available for extensive testing, including Magnaflux, the quality of the steel is assured. If you want to know that you are getting quality steel in your forgings, why not consult with National Forge?





**NATIONAL FORGE & ORDNANCE COMPANY**

IRVINE, WARREN COUNTY, PENNSYLVANIA




# Find these hidden Profits... inside your plant!

**1 MORE CONTINUOUS PRODUCTION**
Vital factor in any production picture is steady, uninterrupted machine operation. Socony-Vacuum Correct Lubrication assures peak machine efficiency and greater overall production.

**2 LOWER MAINTENANCE COSTS**
Correct oils and greases prolong machine life, reduce production losses due to "down-time", minimize repair bills. This means important savings, increased profits.

**3 REDUCE POWER CONSUMPTION**
By reducing friction losses, Socony-Vacuum lubricants cut power waste. In the power plant, correct oils keep turbines, Diesels, steam engines and air compressors operating at peak efficiency.

**4 LOWER LUBRICATION COSTS**
Quality lubricants stand up longer, give maximum protection with minimum consumption. Ultimate lubrication costs are lower. Get these profits for your plant.

GARGOYLE
Lubricants

## Socony-Vacuum Oil Company, Inc.

and Affiliates: Magnolia Petroleum Company, General Petroleum Corporation

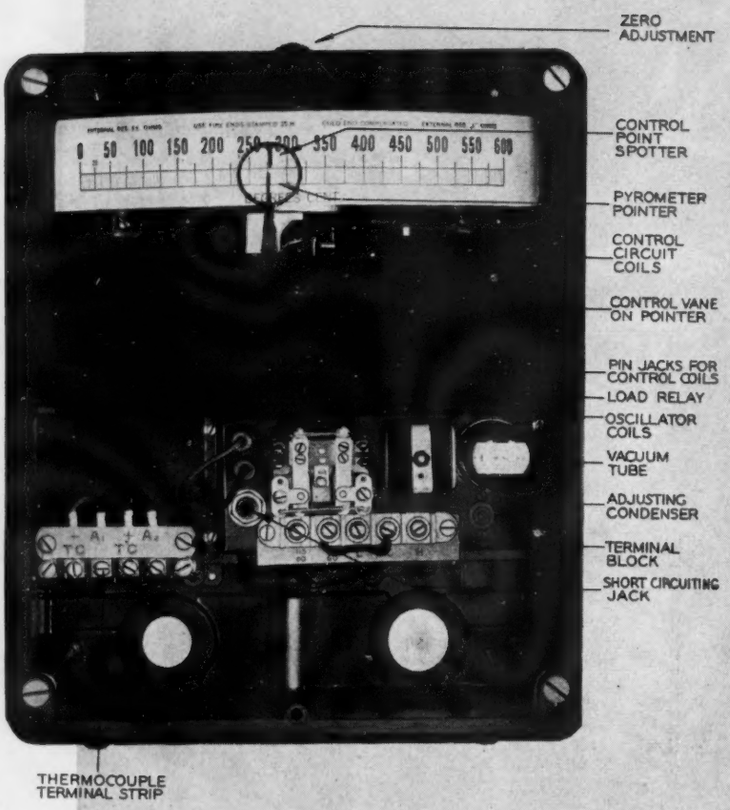
# IN "HOT SPOTS"

## . . . Electrons are "Quicker on the Trigger"

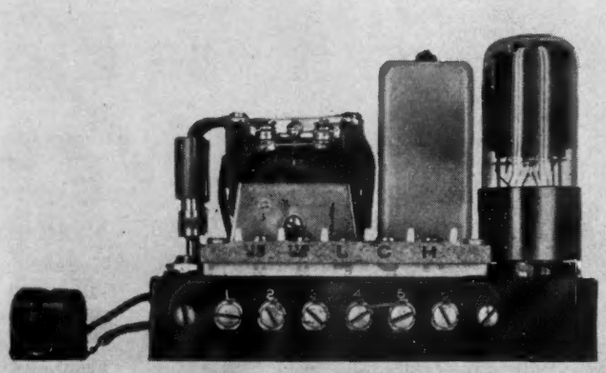
Bristol's Free-Vane Electronic Pyrometer Controller, Model E486, is an up-to-the-minute development for closer automatic temperature-control up to 3600°F. In widespread use on heat-treating and other industrial furnaces, ovens and kilns, this modern, high-quality instrument is simple in construction and positive in action.

**CONTROL IS ENTIRELY ELECTRONIC**

All moving parts, such as motors, depressor bars, toggle switches and contacts are eliminated from the control circuit. This means long, trouble-free service without maintenance, oiling or daily adjusting. The control unit uses a single high-output vacuum tube; a simple variable-condenser adjustment compensates for normal variations in tube characteristics. Snap-action current change in the relay coil provides extreme sensitivity of control, yet variations in temperature or humidity do not affect accuracy. Measuring elements are the standard, highly accurate types regularly used in Bristol Indicating Millivoltmeter Instruments. Since the pyrometer pointer moves without mechanical engagement, an instant, accurate indication is assured at all times . . . Detailed information is contained in Bulletin PB1217. Address THE BRISTOL COMPANY, 149 Bristol Road, Waterbury 91, Connecticut. (The Bristol Co. of Canada, Ltd., Toronto, Ont. Bristol's Instrument Co., Ltd., London, N.W. 10, England.)




Bristol's Electronic Pyrometer Controller consists of two separate units: the pyrometer unit which measures and indicates the temperature, and the control circuit which opens and closes a relay in the load circuit that regulates the fuel supply. There is no mechanical or electrical connection whatever between the two.



Control unit complete with relay, control coils, vacuum tube — *and not a single moving part.*

BRISTOL

*. . . Gives YOU the Most from Heat*

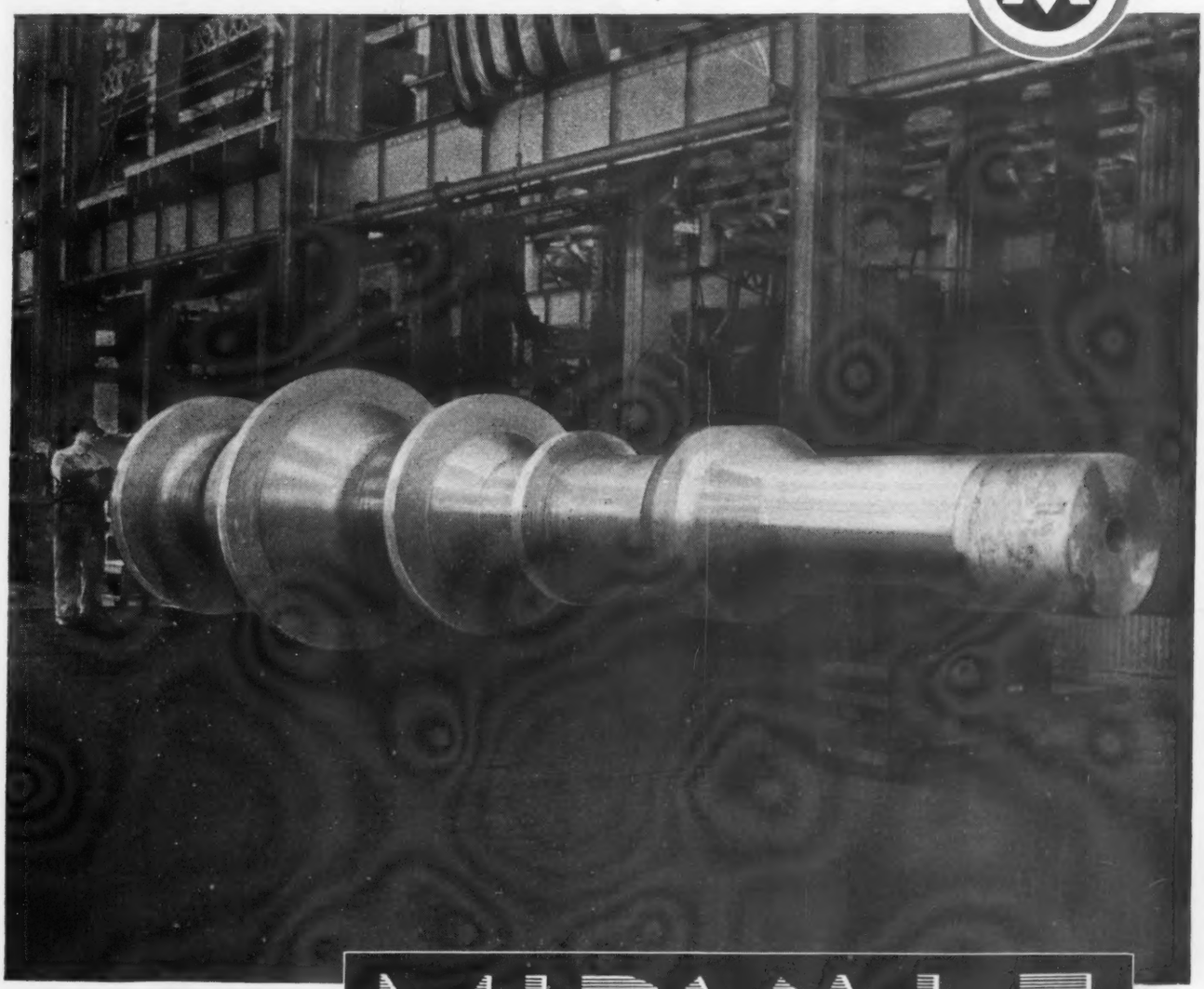
AUTOMATIC CONTROLLING AND RECORDING INSTRUMENTS

## NOT A BUCK ROGERS CREATION

**This is real—here and now . . . a forging of Gargantuan proportions and strength, almost fantastically shaped. To translate the engineer's design in this case into a solid, reliable mass of steel would be to make this machine possible. Midvale was given the work. And Midvale experience, knowledge and equipment, used skillfully, turned a new idea into another Midvale accomplishment.**

*THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA*

OFFICES: NEW YORK • CHICAGO • PITTSBURGH
WASHINGTON • CLEVELAND • SAN FRANCISCO



# MIDVALE

*Custom Steel Makers to Industry*

*One of eight plants to retain original Navy "E"*

# MELTRITE

**More used than any other merchant pig iron...**

P M

**PICKANDS MATHER & CO.**

CLEVELAND • CHICAGO • DETROIT
ST. LOUIS • ERIE • DULUTH
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IRONORE • PIGIRON
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*Such Preference* MUST BE MERITED!

# It's no trick at all . . .

## for the LATHE with a "MAN INSIDE"

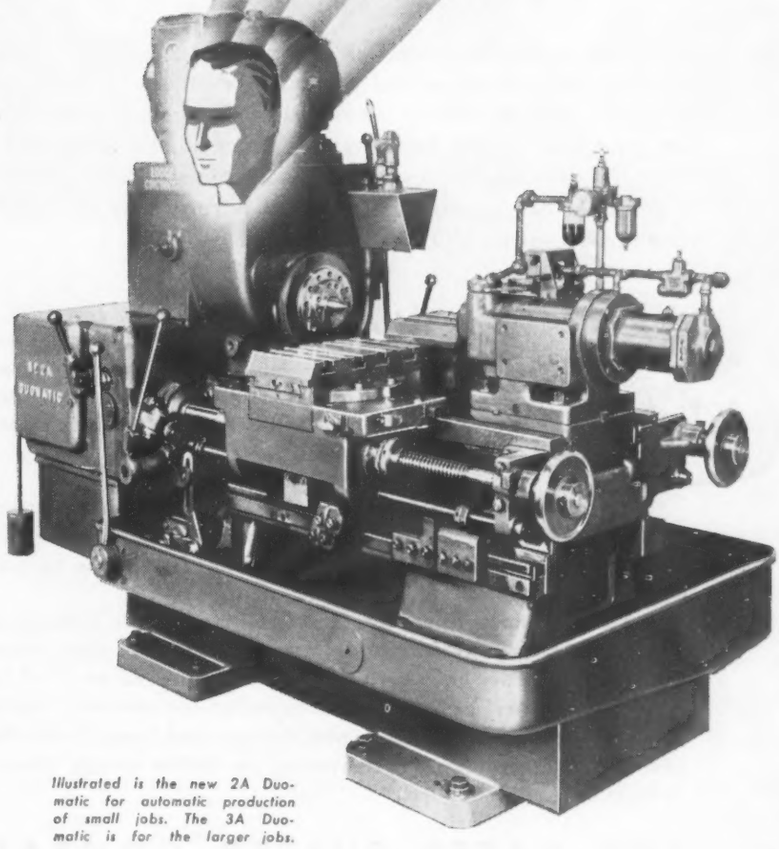
**Unskilled Operator just puts in the workpiece . . . starts the cycle . . . takes out the piece when finished**

On simple or complex multiple tool jobs Duomatic Lathes give CONTINUOUS OUTPUT . . . the unskilled operator merely loads and unloads the workpieces.

Diameters and lengths are automatically established, insure accurate duplication of sizes. Large or small lots are handled with equal ease. Dual tool slides, front and rear, swivel to any angle . . . enlarge the possibilities of multiple tool operations.

And because there are no cams, change of cycles takes minimum time.

These and many other features put responsibility into this automatic lathe—permit unskilled operators to do more work faster, shoot costs downward. Your L & S Engineer will give you detailed figures on Duomatic handling of your own work. Call him now. Write on your company letterhead for Bulletins No. 601 and 620.



*Illustrated is the new 2A Duomatic for automatic production of small jobs. The 3A Duomatic is for the larger jobs.*

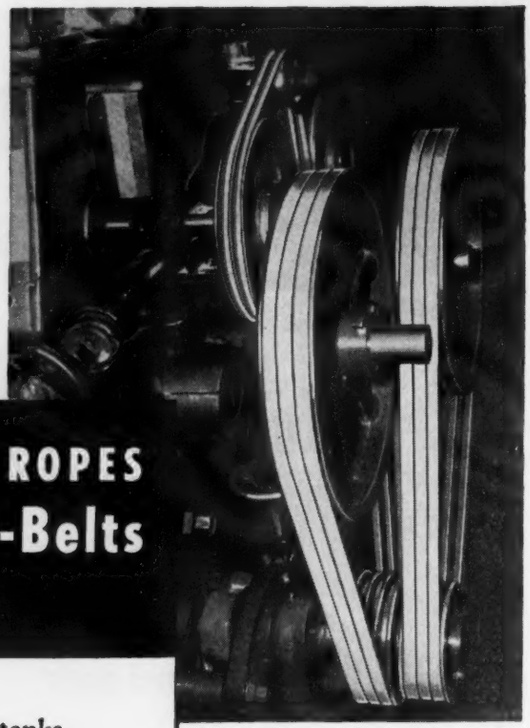
THE LODGE & SHIPLEY MACHINE TOOL CO.

L & S LATHES

CINCINNATI 25, OHIO, U. S. A.

MACHINE TOOL DIVISION 3055 COLERAIN AVE. • SPECIAL PRODUCTS DIVISION 800 EVANS ST.

Here's an important fact



# GATES *Standard* VULCO ROPES are TODAY *Outwearing* any V-Belts Ever Built Before!

The simple fact that during the war our Army's tanks, tractors and self-propelled big guns required V-belts of a strength and durability never thought possible before is bringing substantial benefits to Gates V-belt users today. That is because Gates developed these greatly superior V-belts for our combat units—and here is why this fact is now important to YOU:--

with this simple reason behind it

**Every improvement developed by Gates for U. S. Combat Units— and many later improvements, also—have been added, day by day, to the quality of the Standard Gates Vulco Ropes which have been delivered to you.**

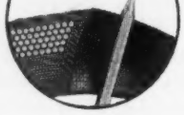
As a result, *long before the war was over,* you were getting in your Standard Gates Vulco Ropes a product built to far higher service standards than any V-belts ever built by anyone before the war.

And the improvement by no means ended there. Through continuing *specialized* research, the service qualities of these superior Gates Vulco Ropes have been still further improved as all of Gates facilities and energies have been returned to the service of industry.

These are the simple reasons why the standard Gates Vulco Ropes you are getting today are delivering far better service than any V-belts ever built before!

**THE GATES RUBBER COMPANY**
**DENVER, Colorado**
*World's Largest Makers of V-Belts*

All Gates V-Belts are Built With *The Patented* CONCAVE SIDE



Gates
THE MARK OF SPECIALIZED RESEARCH

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# GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

## For New Installations or Replacement Needs

# USE BROWN & SHARPE PUMPS

# THAT ARE BUILT FOR THE JOB

Into the manufacture of these pumps is incorporated the same attention to design detail and the familiar standards of accuracy, that characterize our machine and tool equipment.

Extensive laboratory and testing facilities enable us to maintain a constant check on materials and workmanship. Daily experience with hundreds of pumps in our plant and the added experience gained from pumps we install on new machines, gives us first-hand knowledge indispensable to the manufacture of efficient, reliable, long-lived pumps.

For complete information get a copy of our latest pump catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

**GEARED • VANE • CENTRIFUGAL • MOTOR DRIVEN**

*We urge buying through the Distributor*

# BROWN & SHARPE

Udylite has made an intensive study of electroplating and allied arts. The work of its Research and Development Division is a well-organized, full-time operation.

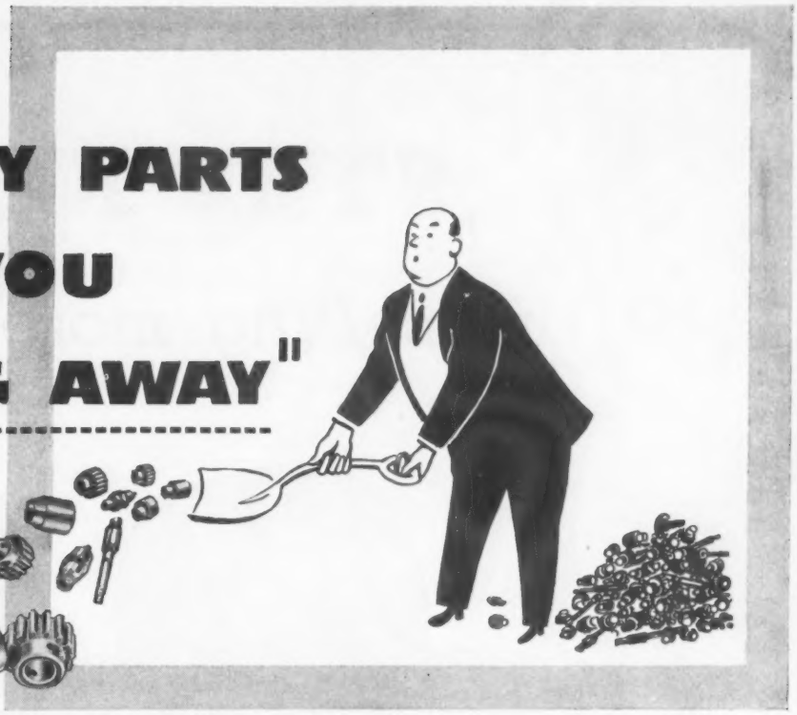
In the last 27 years Udylite engineers and electrochemists have encountered a wide range of problems and uncovered a vast amount of valuable information.

Udylite equipment has been built on this foundation. A few of the available descriptive bulletins are shown here.

If you would like to have any of these bulletins, tell us which ones. If none seems to bear on your individual problem, tell us what it is. Our engineers will have some information that may save you a lot of time and effort.

THE Udylite CORPORATION
1651 EAST GRAND BOULEVARD
DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES

# HOW MANY PARTS ARE YOU "THROWING AWAY"



## SPEED CASE x1515

***A LOW CARBON OPEN HEARTH PRODUCT***

**SPEED CASE x1515 Steel will materially reduce your rejections, now due to excessive warpage, bad finish, tool marks, etc.**

**The unusually high free machining qualities of SPEED CASE (250 S.F.P.M.) assure increased production with excellent finish of machined parts maintained. Distortion resulting from carburizing is reduced to a new low with SPEED CASE STEEL. Many plants report sufficient production increases, or savings on rejections, to pay for the steel.**

***Write for our Brochure which gives complete data and Case Histories furnished by our customers.***

*Tear this off* . . . ATTACH TO YOUR LETTERHEAD AND MAIL TO EITHER COMPANY BELOW

Licensor

**MONARCH STEEL COMPANY**

HAMMOND · INDIANAPOLIS · CHICAGO

PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF A COMPLETE LINE OF COLD FINISHED CARBON AND ALLOY STEEL BARS

Licensee for Eastern States

**THE FITZSIMONS COMPANY**

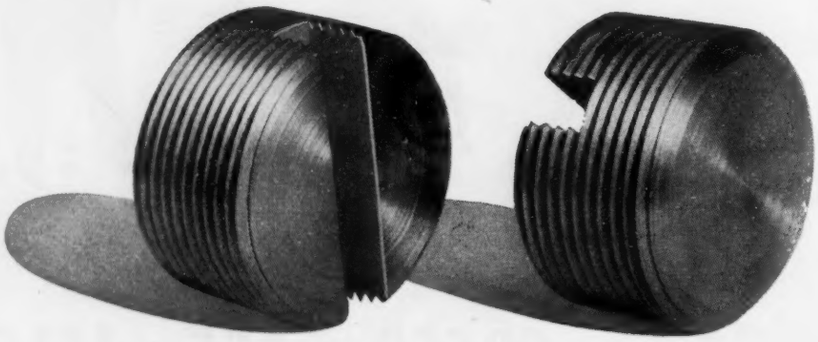
YOUNGSTOWN, OHIO

**ACTUAL PHOTOGRAPH**

Speed Case (.20 carbon) 1 inch cold drawn bar tied in a knot, without fracture.

# STEP NO. 1

## *in selling more goods*



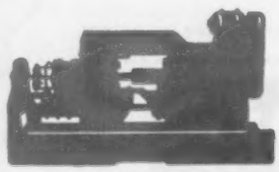
Look at this typical example of Acme-Gridley cost reducing practice.

Here is a steel automotive part, $1\frac{1}{4}$" diameter, turned from bar stock on a $1\frac{5}{8}$" Acme-Gridley Bar Automatic. 10 operations include threading by $1\frac{1}{16}$" Vers-o-tool with ground thread circular chasers, slotting by rotating attachment, and pick-off for fine finish on the cutoff. No secondary operations necessary — no additional machines required.

Total machine time for 10 operations is 14 seconds—machine production exceeds 250 per hour, with required precision positively assured.

Savings like this help you in two ways—(1) they enable you to reach broader markets through better competitive selling prices, and (2) they help you to protect normal profits on existing sales volume.

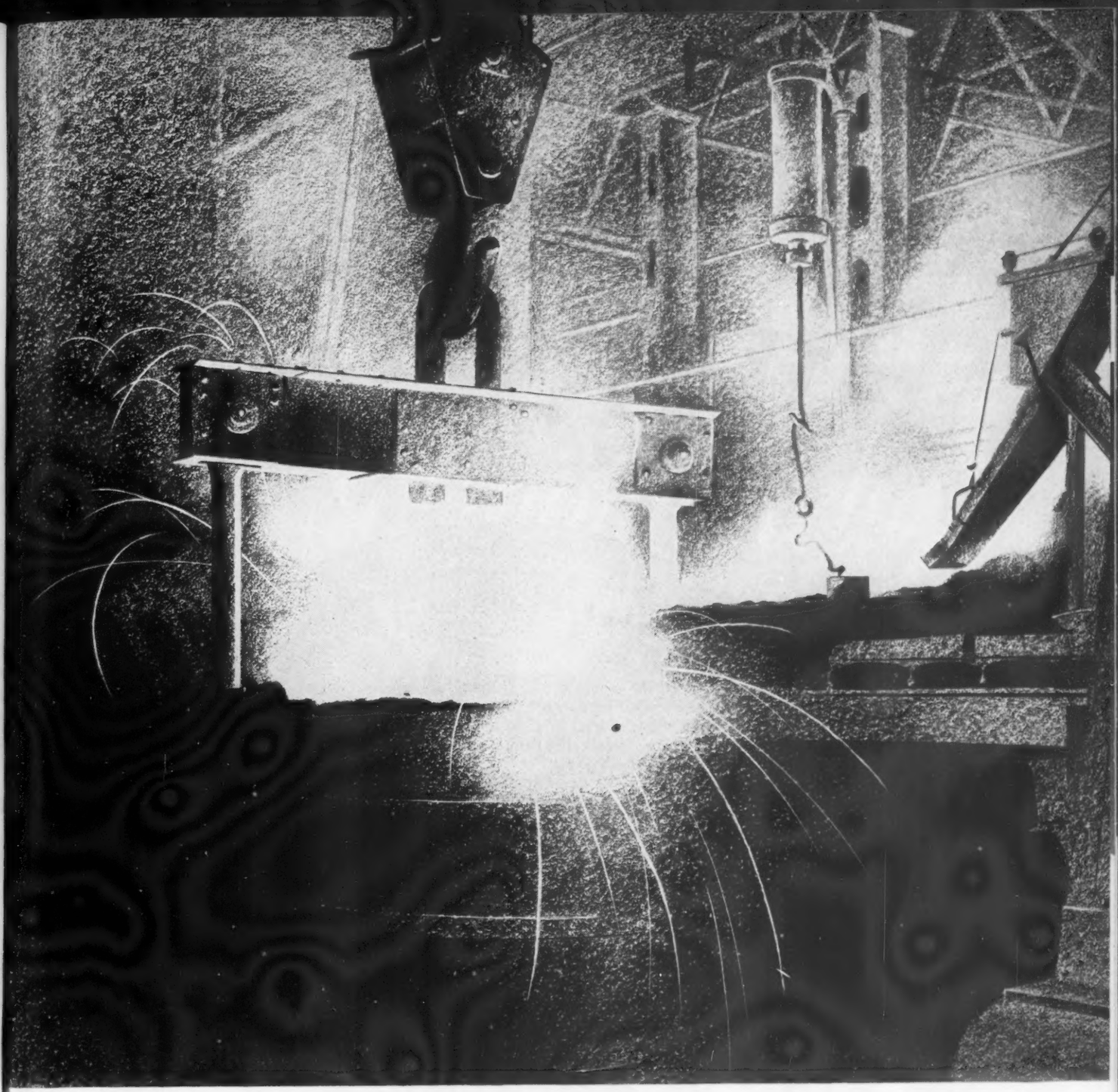
For whatever parts you need in production quantities, we suggest that you let our engineering department show you today's methods of getting costs down.



*ACME-GRIDLEY*
*BAR and CHUCKING AUTOMATICS*
Maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

**THE NATIONAL ACME COMPANY**

170 EAST 131st STREET • CLEVELAND 8, OHIO



# VANCORAM FERRO TITANIUM

## FOR SOUNDER RIMMING STEELS

Vigorous but controlled rimming action and uniform contraction of ingots in the molds are the outward signs of good deoxidation practice in producing open steels. Controlled deoxidation, with consistent results from heat to heat, is assured with Vancoram Brand Ferro Titanium.

Ferro Titanium is used in rimming steels where silicon is undesirable. Vancoram Brand Ferro Titanium is held within carefully specified limits of composition to assure uniformity of results by its use, year after year.

Steelmakers use Vancoram Brand Ferro Titanium to obtain consistently sounder ingots with subsequently greater yields in conversion to the final form required. Blowholes occur only where they are intended to be, and piping is held to a minimum.

There are many variable factors in the production of rimming steels. Vancoram Brand Ferro Titanium eliminates some of the more troublesome of these variables.

| HIGH CARBON | | MEDIUM CARBON | |
|---|---|---|---|
| Titanium | 15 to 18% | Titanium | 17 to 21% |
| Carbon | 6 to 8% | Carbon | 3 to 4.50% |

| LOW CARBON | | | |
|---|---|---|---|
| Titanium | 20 to 25% | Titanium | 38 to 43% |
| Carbon | 0.10% max. | Carbon | 0.10% max. |
| Silicon | 4.00% max. | Silicon | 4.00% max. |
| Aluminum | 3.50% | Aluminum | 8.00% max. |

MAKERS OF VANCORAM FERRO ALLOYS AND METALS

**All grades of Ferro Titanium are available from stock, crushed to various sizes, as required. We will be glad to show you how you can use Vancoram Ferro Titanium most advantageously in your production.**

# VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

# PRECISION GENERATED

# INTERNAL GEARS

## UP TO 18 FEET DIAMETER

In the swing mechanisms of power shovels and ladder trucks, in machine tools, and in numerous other applications, Farrel precision generated internal gears are giving efficient, long-life performance under severe operating conditions.

Their smooth, quiet operation is due to accuracy of tooth contour and tooth spacing inherent in the famous Farrel-Sykes method by which the teeth are generated.

You can get Farrel internal gears in any size up to 18-feet diameter, 12-inch face, 1¼ DP, precision generated with either spur or single helical teeth.

Internal gears frequently meet design and operating conditions better than other types and their availability in large sizes has extended their advantages to many applications where size limitations formerly prevented their use.

Next time you need internal gears, the facilities and experience of the Farrel organization in the design, manufacture and operation of gearing of all types are at your service.

**FARREL-BIRMINGHAM COMPANY, INC.**

344 VULCAN ST., BUFFALO 7, N.Y.

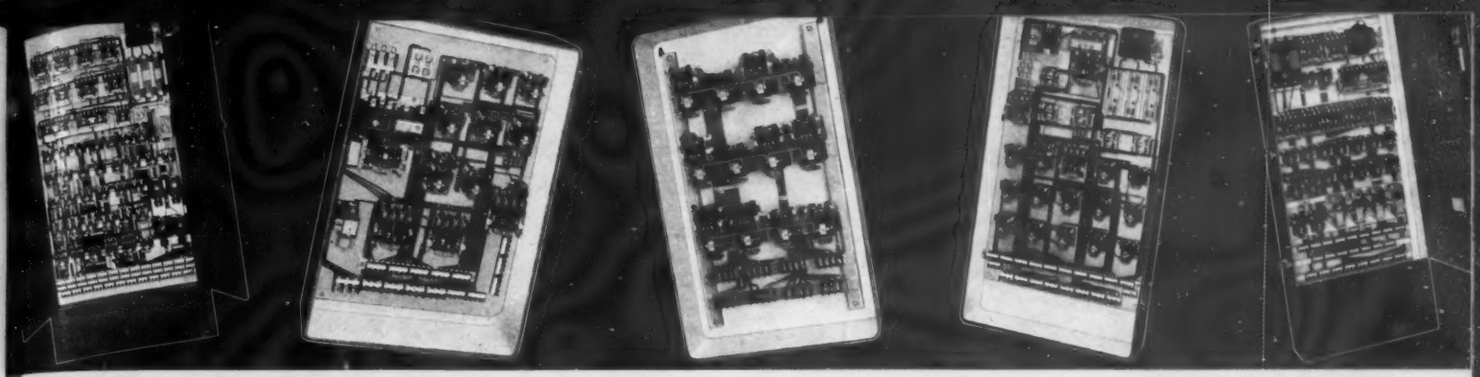
*Plants:* Ansonia, Derby and Stonington, Conn., Buffalo, N.Y.

*Sales Offices:* Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles, Tulsa, Houston, Charlotte.

This Farrel precision generated internal spur gear has 108 teeth, 1½ DP, 4¾" face, 72.225" ID. The pinion has 13 teeth, 1½ DP, 5⅛" face, 10.358" OD.

FB-310

*Farrel-Birmingham*



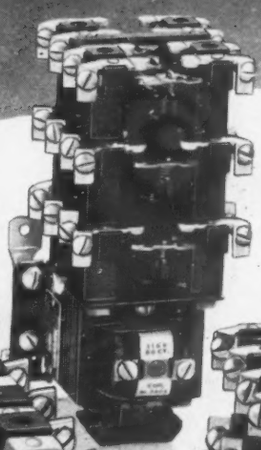
# For your SPECIAL CONTROL PANELS...

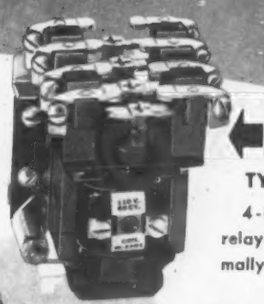
## BULLETIN 700 *Solenoid Relays*

### Good for Millions of Operations

**TYPE B-840**

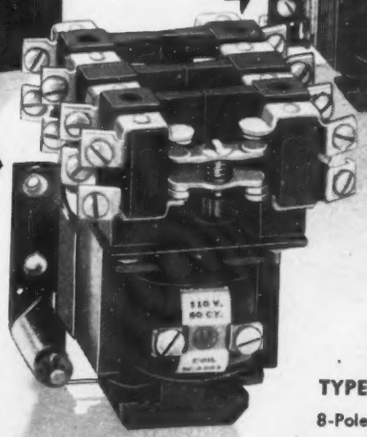
12-Pole relay with eight normally open contacts and four normally closed contacts.





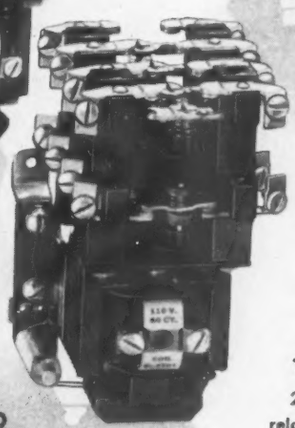
**TYPE B-400**

4-Pole solenoid relay with four normally open contacts.



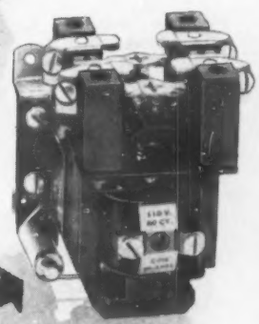
**TYPE B-440X**

4-Pole relay with "up-and-down" contacts — any contact may be wired to provide either normally open or normally closed operation. Carry this relay in stock and you'll have the "right" relay on hand at all times.



**TYPE B-440**

8-Pole relay with four normally open contacts and four normally closed contacts.



**TYPE B-200**

2-Pole solenoid relay with two normally open contacts.

## ALLEN-BRADLEY

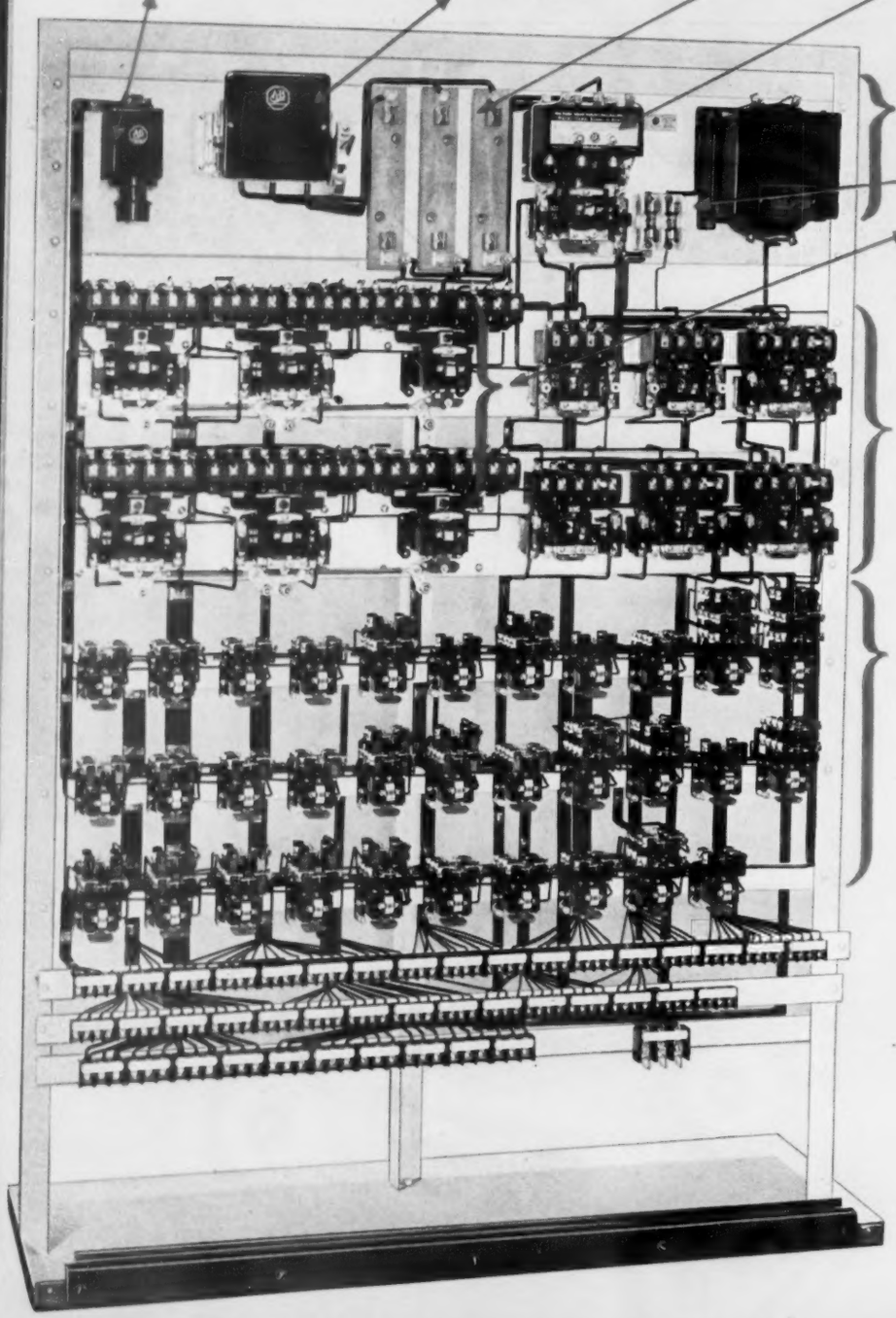
## SOLENOID MOTOR CONTROL

QUALITY

A-B Quality

# Special Control Panels

## Built from Standard Solenoid Control Units



**Bulletin 849 Timing Relay**
A reliable, adjustable relay for the accurate timing of sequencing operations.

**Disconnect Switch**
Has quick make and quick break contact action. Double break, silver alloy contacts assure trouble-free operation.

**Main Line Fuse Clips**

**Bulletin 709 Across-the-Line Starter**
The Size 2 solenoid starter is compact, simple, and trouble-free. Two thermal overload relays protect the motor from damage due to sustained overloads.

**Step-Down Transformer**
The 440 volt line voltage is reduced to 110 volts for operation of push button and pilot control stations—an added "safety" feature for the operator.

**Pilot Circuit Fuses**

**Bulletin 715 Multispeed Starters**
These two solenoid starters control two-speed, consequent-pole, constant-torque motors, and provide for reversing at high speed. They consist of three mechanically interlocked magnetic contactors with thermal overload protection. Double break, silver alloy contacts.

**Bulletin 709 Across-the-Line Starters**
The Size 1, Bulletin 709 solenoid starting switch is insulated from its metal base plate and can be mounted directly to any metal frame structure. Totally enclosed contacts prevent all possibility of arc flashovers and also permit close grouping of starters and contactors.

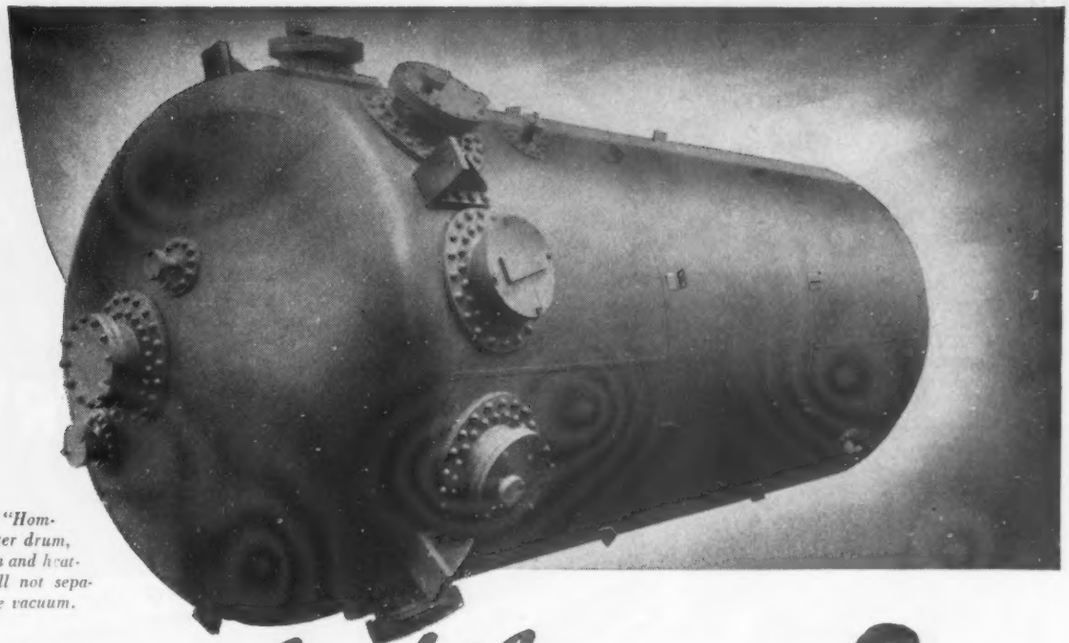
**Bulletin 700 Solenoid Relays**
These solenoid type relays are good for millions of operations. They have no bearings, pivots, or pins to bind and cause trouble and are remarkably consistent in operating speed. Available in from one to twelve poles, in many types, for practically any voltage.

● This special motor control panel was built for The Sommer and Adams Company for a special automatic machine tool for drilling and tapping axle shafts. All of the units used on this panel are standard items from the Allen-Bradley line. These control units are only a few of the many standard Allen-Bradley solenoid type switches which can be used for the construction of special motor control panels. All have double break, silver alloy contacts which require no contact maintenance. Write for complete information.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wisconsin

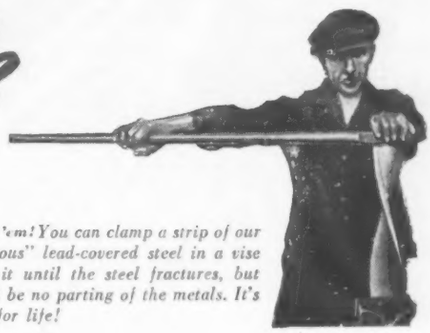
A-B Quality

**ALLEN-BRADLEY**
SOLENOID MOTOR CONTROL
QUALITY



*You can't beat this drum. A "Homogeneous" lead-lined treater drum, designed to resist corrosion and heat-creep. Its lead lining will not separate — even under extreme vacuum.*

# Bonded for Life



*Try and part 'em! You can clamp a strip of our "Homogeneous" lead-covered steel in a vise and twist it until the steel fractures, but there will be no parting of the metals. It's bonded for life!*

## No Wonder "HOMOGENEOUS" Lead-lined Equipment stands up under Extreme Operating Conditions

The handling of acids and other corrosive liquids is frequently very tough on equipment.

This is particularly true when the problem is aggravated by conditions involving vibration, vacuum, high pressure, repeated thermal changes and shock impact.

To meet such conditions — as well as those where heat transfer is important — National Lead offers a complete range of "Homogeneous" Lead-lined or Lead-covered Equipment.

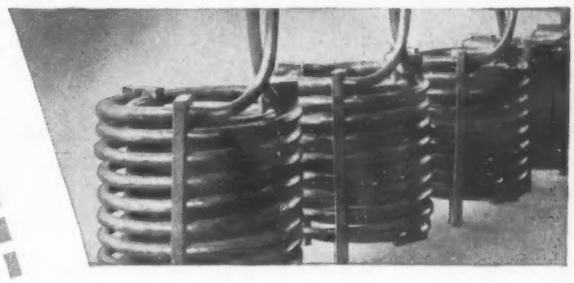
Its outstanding feature is the tenacious adhesion of the lead to the steel, copper or brass of which the apparatus is constructed. By our special "Homogeneous" method, the lead lining or covering is inseparably bonded — giving positive assurance that it will not creep, buckle or in any way separate. And, because no tin or tin-lead solder is used in the bonding, the equipment can be used safely at temperatures closely approaching the melting point of the lead itself.

Thus, under shock, vibration, vacuum and temperature change, this rugged "Homogeneous" equipment goes on doing its job — cutting down costly replacements, and even more expensive shut-downs — proving itself, time and time again, a sound, profitable investment.

**Made to Specification** — Because no two acid handling projects present exactly similar requirements, all National Lead "Homogeneous" equipment is fabricated to specification . . . specially designed and constructed to meet given conditions.

* * *

And remember, whether you need lead pipe, fittings, valves . . . *anything in lead* up to a complete acid recovery plant . . . National Lead can supply you. And give you the benefit of years of experience in thousands of acid processing applications.



***Some like 'em hot, some like 'em cold.*** *The four coils illustrated are lead-covered copper for use in a pigment manufacturing plant. National Lead "Homogeneous" heating and cooling coils are in wide use throughout industry.*

**Specify "Homogeneous" for:**

Acid car and trailer tanks, acid columns, agitators, autoclaves, digestors, heat exchangers, vacuum tanks, lead-covered heating and cooling coils and other similar uses.

**If Acid Handling is your Problem . . .**

## Go "National" for Lead

**NATIONAL LEAD COMPANY**
111 Broadway, New York 6, N. Y.
Offices and Plants in Principal Cities and Canada

IF you regard WALLACE BARNES as a large-scale spring production plant only, mark well this fact:

*No spring order is ever considered too small for our attention.* Separate departments are maintained for just this purpose—samples, small orders, emergency service—overnight delivery if needed.

We aim to provide spring production in whatever degree you need. Say the word, and let performance be the measure.

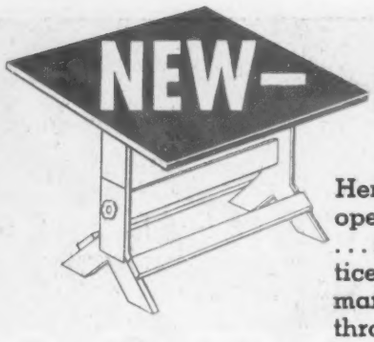
*SPRINGS*
*SMALL STAMPINGS*
*WIRE FORMS*

*SPRING STEEL*

# Barnes-made springs

*Engineered Pep and Power*

WALLACE BARNES COMPANY
*Division of Associated Spring Corporation*
*Bristol*
*Connecticut*



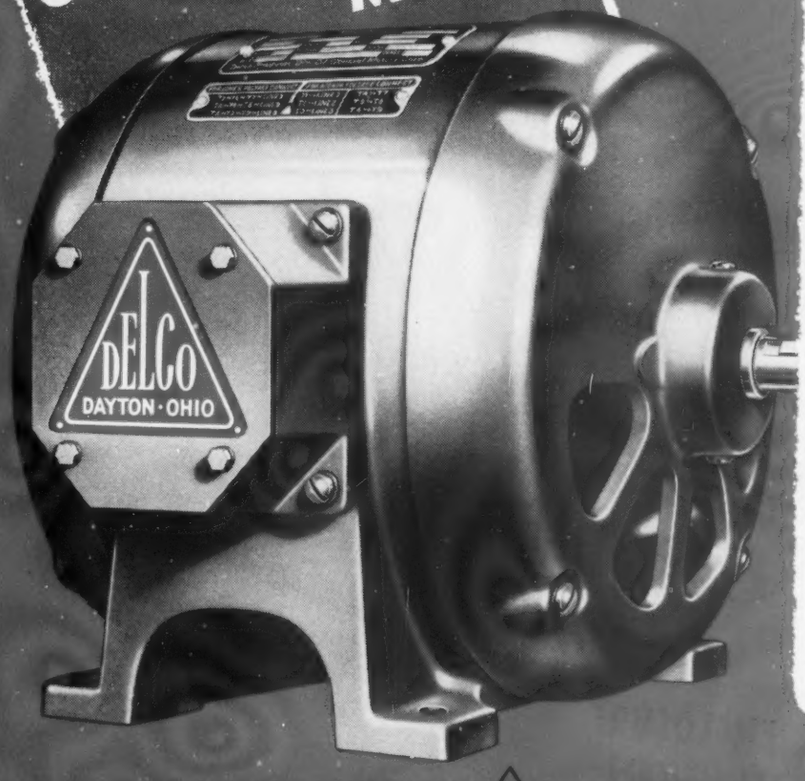

# from the drafting board up!

Here's something entirely new in open-type general-purpose motors . . . incorporating new design practices, improved materials and manufacturing methods developed through General Motors' varied resources.

Take a look first at the rugged frame. It has been redesigned to provide complete top-half enclosure that protects the interior from dripping liquids, falling chips, dropping particles. And inside you'll find other great new features: shielded and sealed type ball bearings, preventing grease leakage into windings—fewer parts requiring service—new improved ventilation and insulation. In fact, *everything* about this compact and sturdy motor points to peak performance, minimum maintenance and maximum life!

The new Delco general-purpose ball-bearing motor is available to meet the torque and starting requirements of almost unlimited industrial applications. Write today for complete engineering data and delivery schedules.

## NEW DELCO GENERAL-PURPOSE MOTOR



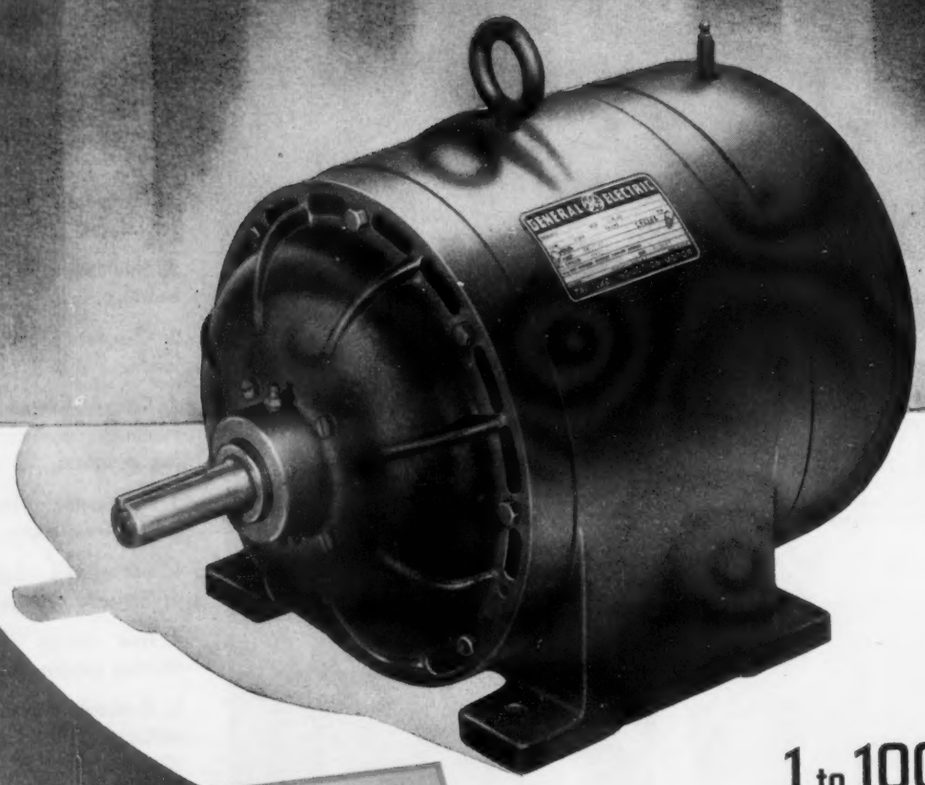

### 8 GREAT FEATURES
**of the new Delco general-purpose motor**

1. Complete top-half enclosure for interior protection.
2. Shielded and sealed type ball bearings.
3. Complete ventilation and insulation.
4. Extra-large conduit box with minimum overhang—usable in four positions.
5. High-grade carbon steel shaft ground from center.
6. Rotor and shaft assembly dynamically balanced.
7. Four classes of torque and starting specifications.
8. Available horsepower ratings conforming to NEMA frame sizes 203 through 365.

# DELCO MOTORS

DIVISION OF GENERAL DELCO PRODUCTS DAYTON, OHIO MOTORS CORPORATION

# GENERAL ELECTRIC Announces




1 to 1000 hp

COMPLETE ENCLOSURE
FOR PROTECTION
AGAINST DIRT, DUST,
AND WEATHER

# NEW

## *Totally Enclosed*

## TRI/CLAD MOTORS

REG. U.S. PAT. OFF.

In 1940, G.E. introduced the Tri-Clad open motor—with emphasis on the feature that industry wanted most in a motor, *protection.* Since then, more Tri-Clads have gone into service than any other integral-horse-power motor.

Today, we are ready with a new line of Tri-Clad motors—*totally enclosed, fan-cooled motors*—built on Tri-Clad design principles in both standard and explosion-proof types.

We believe that these are industry's most dependable motors. They are designed specifically for use in many adverse atmospheres—in iron dust, outdoors, in hazardous areas, and chemical atmospheres. Their scope of application is as wide as the field of industrial motor use. Safeguarded against most sources of motor damage, their longer life and lower maintenance will make them economical motors for use on almost every job. *General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

780-251

## FOR 101 METAL CUTTING JOBS

*The No. 8 showing new Wells Wet Cutting System —an economical accessory available for all No. 8 Wells Saws.*

# WELLS NO. 8

## A WISE INVESTMENT

When you plug this Wells No. 8 Metal Cutting Band Saw into an electric outlet around a sawing job, it starts paying for itself. It will cut every type and size metal you can clamp into its quick-acting vise. Efficient, rugged, easy to operate, it saves time and labor.

You can use this Wells No. 8 in the storeroom, tool room, for maintenance or production work. Gravity-feed and automatic shut-off make it possible for one man to operate two or more of these Wells saws simultaneously. And because it's portable, you save time and labor by moving the saw to the work.

Thousands of Wells No. 8's are in use today—proof indeed that they are a wise investment for any metal working plant. Write today for details.

### *Specifications*

| | |
|---|---|
| CAPACITY: Rectangular | 8" x 16" |
| (Special Guides) | 5" x 24" |
| ROUNDS: | 8" Diameter |
| MOTOR: | ½ H.P., A.C. or D.C. |
| SPEEDS: | Selective 60, 90, 130 feet per minute |
| WEIGHT: | Approximately 750 pounds |

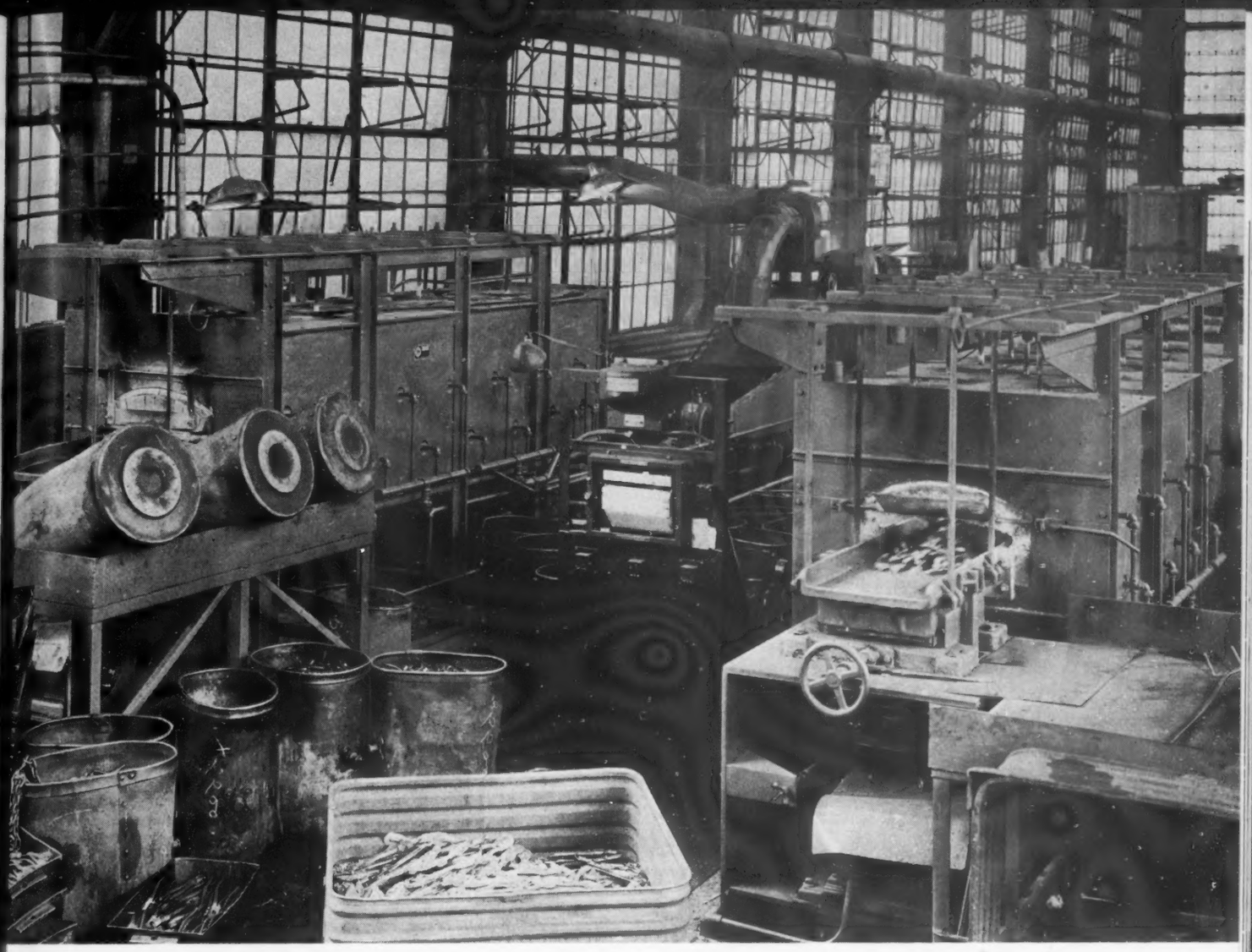
Wells SAWS

Wells

*Products by Wells are Practical*

# METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN



## WIDE VARIETY OF HAND TOOLS NORMALIZED, HARDENED IN RECIPROCATING HEATING MACHINES AT PECK, STOW & WILCOX CO.

SELECTED FOR THEIR VERSATILITY, these A.G.F. Reciprocating Heating Machines continuously heat treat many types and sizes of mechanics' hand tools at the modern plant of the Peck, Stow & Wilcox Co., at Southington, Connecticut.

CONVENIENT LOADING PLATFORMS facilitate charging of the work in this well-planned installation. Work placed upon the reciprocating hearth is advanced through the heat step-by-step under its own momentum. Gas firing by means of many small, carefully distributed burners assures uniform heating.

FOR NORMALIZING FORGINGS FOR GRAIN REFINEMENT, the open-hearth Reciprocating Heating Machine at the right is used. Pieces put through this machine include forgings for pliers, tinners' snips, chisels, and axes. Work is discharged directly onto a slow-cooling conveyor, from which it is deposited into a receiving bin.

CLEAN HARDENING OPERATIONS are carried out in the second machine, which is of the full-muffle type. In this unit, hand tools such as pliers, wrenches, and hammers are either heat treated to their final hardness, or given an overall toughening treatment prior to localized hardening of the working area. Work from this machine is discharged through a sealed chute into an A.G.F. Automatic Quenching Tank, from which it is conveyed for subsequent tempering operations.

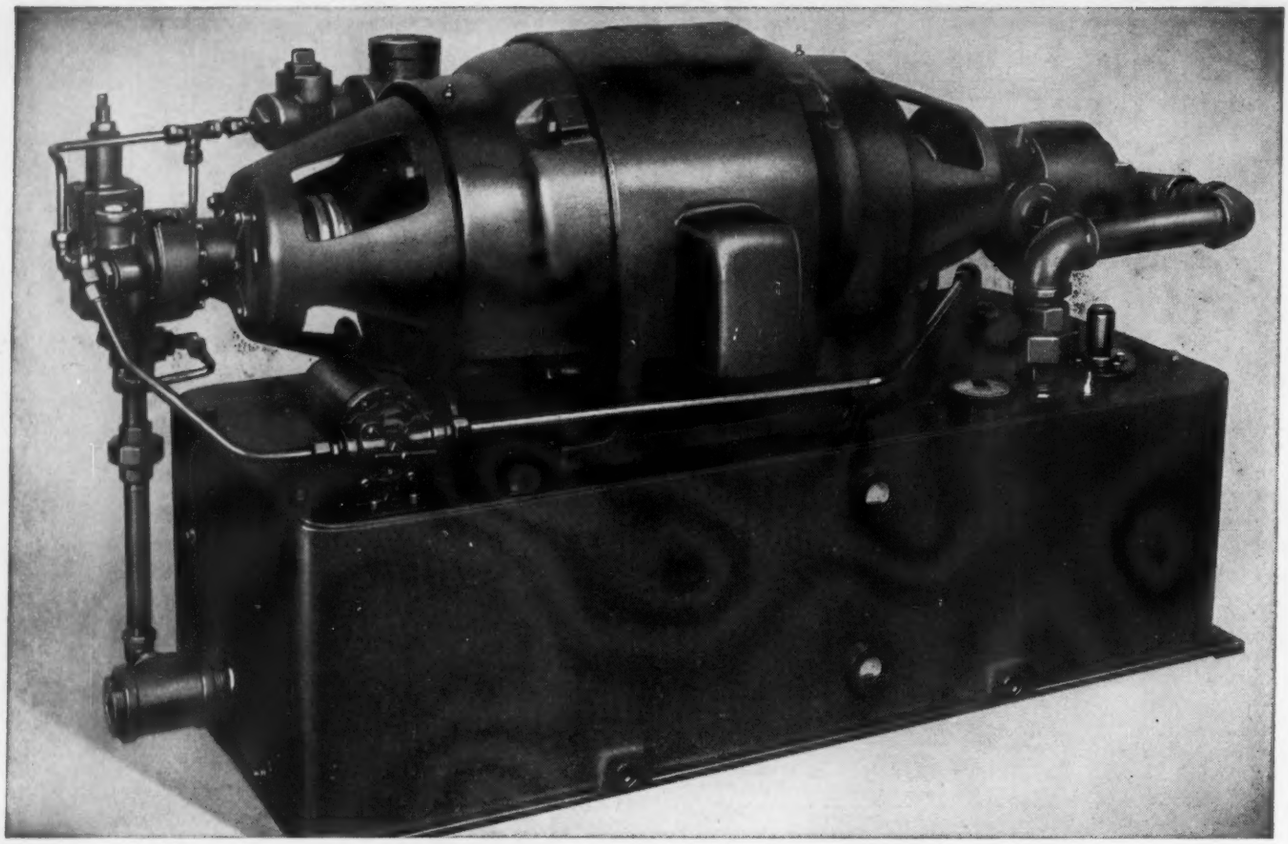
RECIPROCATING HEATING MACHINES are made in five different sizes, with capacities ranging from 10 to 1200 lbs. of work per hour. In addition to clean hardening and normalizing, they may be used for many other varied applications, including annealing, case-hardening by the patented Ni-Carb process, and other forms of general and atmosphere work.

WRITE FOR NEW CATALOG NO. C-1302, giving details on Reciprocating Heating Machines and other A.G.F. Heat Treating Equipment.

# AMERICAN GAS FURNACE CO.

*Elizabeth, New Jersey*

AMERICAN GAS FURNACE CO. PIONEERS 1878



## HYDRAULIC POWER UNITS • 3000 P.S.I.

***Packaged Assemblies Combining High Pressure Low Volume and Low Pressure High Volume Pumps and Valves for Manual and Automatic Control***

PRESSES • CALENDER ROLLS • HYDROSTATIC TESTS • ROLL BALANCING
BROACHES • PRESSURE SEALS • FLOW TESTS • BEARING FLOTATION

# *Hy-Lo Hydraulic Unit*

21 GPM • 3000 P.S.I.

**These units have been in extended service in Rolling Mills • Textile Plants • Chemical Plants • Plastic Plants • Testing Laboratories • Research Laboratories • Rubber Plants • Powdered Metal Industry • Aviation Research • Airplane Manufacture for Standard Equipment and Production Test Procedure**

***3000 P.S.I. Pumps in Capacities of ½- 1- 2- 3 GPM • Hy-Lo Combinations 5 GPM and Up***

•

**Experienced Hydraulic Engineers Are Available Without Obligation**

•

## THE NEW YORK AIR BRAKE COMPANY

*Hydraulic Division*

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • FACTORIES: WATERTOWN, N. Y.

They CALLED BRANDT FOR PRECISION METAL WORK

# For STAMPINGS of

## EXTREME RANGES IN SIZES AND METALS

### for HOME APPLIANCES

The production of electric iron housings is a typical example of Brandt's facilities to produce smaller stampings. These stampings are of aluminum, weigh less than ¼ lb., and meet close precision specifications. They were produced on a mass production schedule, on a rush delivery basis.

### for AIRCRAFT

This large aluminum alloy stamping is part of a fuel tank Brandt completely fabricated for a leading Aircraft Manufacturer. This bulky stamping (4'-2" x 3'-5" with 5" draw) was pressed out in one operation on the huge hydraulic press, here shown.

***Free Catalog!***

**Write for this catalog. for illustrated details of the wide range of Brandt Facilities.**

### RANGE OF FACILITIES

The range of Brandt stamping facilities enables us to handle stampings from one ounce to 250 lbs. in: mild steel, stainless steel, aluminum, magnesium, or alloy metals.

Brandt services include: *fabricating, arc and spot welding, shearing, rolling, forming,* and *stamping.* Whether your metal needs are large or small . . . mass production or "tailor made" . . . call Brandt.

Call **BRANDT** BALTIMORE

CHARLES T. BRANDT, INC., 1700 RIDGELY ST., BALTIMORE-30, MD.

*Precision* METAL CRAFTSMEN SINCE 1890 ★ ★ ★ ★

# *Industrial* BRUSHES

## of all types FOR BETTER PRODUCTION AND MAINTENANCE

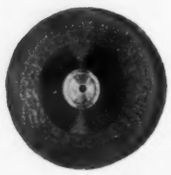
● Consult with our engineering representatives. They will gladly work with you in developing "Even Trim" Spiral Wound Brushes, of wire, horsehair or tampico, to meet your particular finishing requirements.

### PERFECT BALANCE

Carefully controlled distribution of the brushing stock gives perfect balance and maximum efficiency to these power driven rotary brushes. Wire or fiber. May be used as individual sections or in assemblies.

### UNI-FILL

These scratch brushes are uniformly filled. They are trimmed with a "bite" to give the best performance obtainable with hand scratch brushes.



### RED CENTER

Red Center Wheel brushes made in various diameters and degrees of stiffness for many different applications are sturdy in construction and in perfect balance.

*Brush Division*
PITTSBURGH
PLATE GLASS COMPANY

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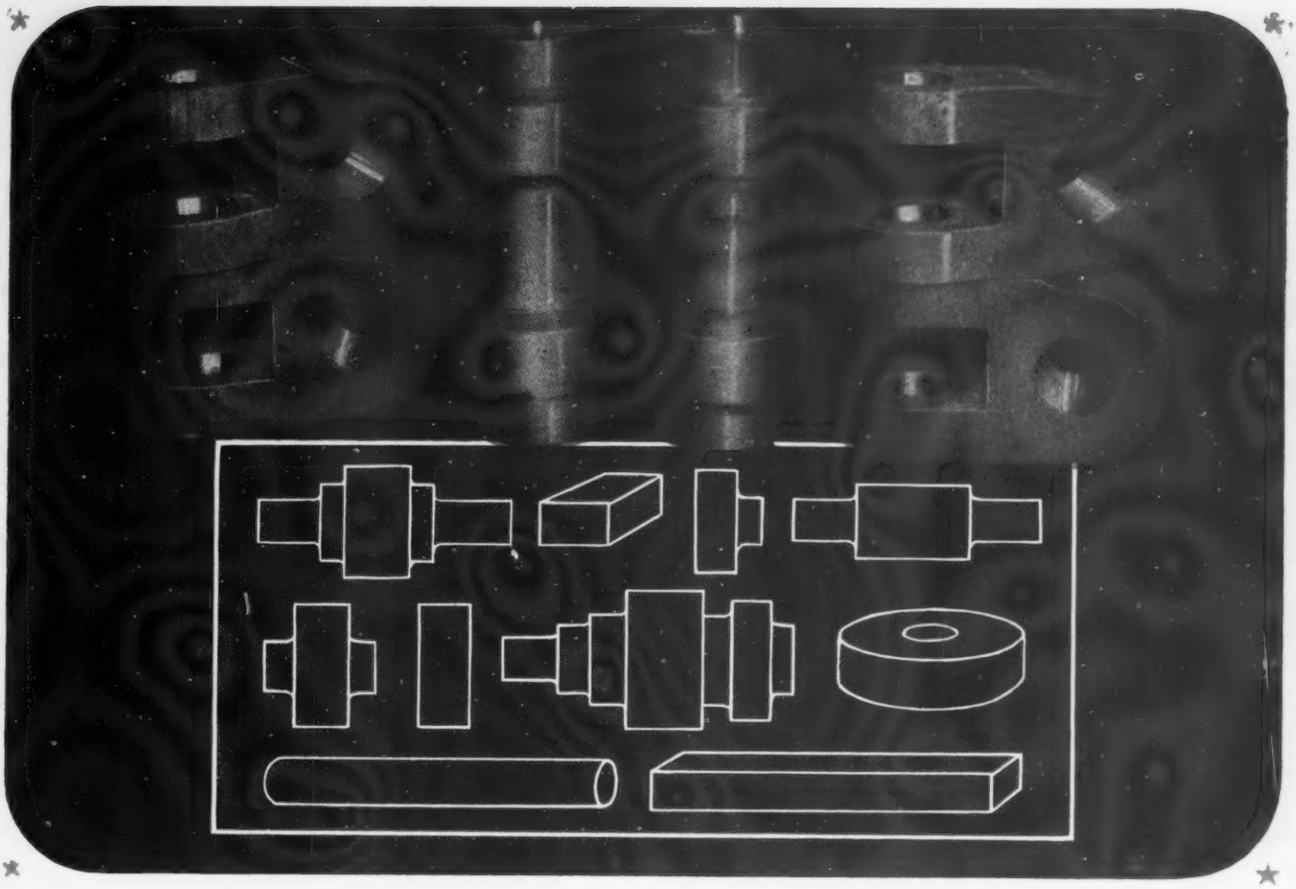

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Any Allegheny Ludlum field representative will gladly give you further particulars, or write us direct.

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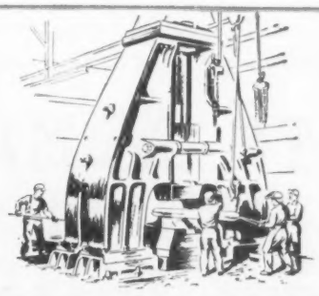

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**STEEL CORPORATION**
*Forging and Casting Division*
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## FOR HIGH PRODUCTION

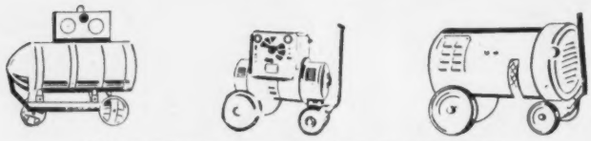
# SURPLUS RESISTANCE WELDERS

Now is the time to pick up modern high-production equipment at low cost. Available now, for early delivery are quantities of surplus spot, seam and butt flash welding machines—many unused or used for only short periods. True, much of the equipment was designed for special applications—but nearly all of it is readily adaptable to peacetime product needs—and such needs are being considered in pricing. Chances are that you can find just the equipment you need to modernize your operations or complete your new production plans. So contact your nearest War Assets Administration Regional Office today—write, wire or phone, or use the coupon below.

ALL ITEMS ARE SUBJECT TO PRIOR SALE!

**AND FLASH WELDERS**

Located in Philadelphia, Detroit, Chicago, Los Angeles, Cleveland, Kansas City, Birmingham, and Boston for quick sale.



**LINCOLN, HOBART, AND WESTINGHOUSE ARC WELDERS**
DC and AC Types; 300 to 400 amperes
DC available in large quantities.

**WELD POSITIONERS**
Many sizes and capacities including head and tailstock combinations.

**FLAME CUTTERS**
Both portable and stationary, single and multiple torch types.

**VETERANS OF WORLD WAR II:** To help you in purchasing surplus property, veterans' units have been established in each War Assets Administration Regional Office.

**FREE FACTS** TO WAR ASSETS ADMINISTRATION

Please send me information on the availability, location and condition of the following types of equipment:

- ☐ SPOT WELDERS
- ☐ SEAM WELDERS
- ☐ FLASH WELDERS
- ☐ HOBART ARC WELDERS
- ☐ WESTINGHOUSE ARC WELDERS
- ☐ WELD POSITIONERS
- ☐ LINCOLN ARC WELDERS
- ☐ ..... ARC WELDERS
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176-3

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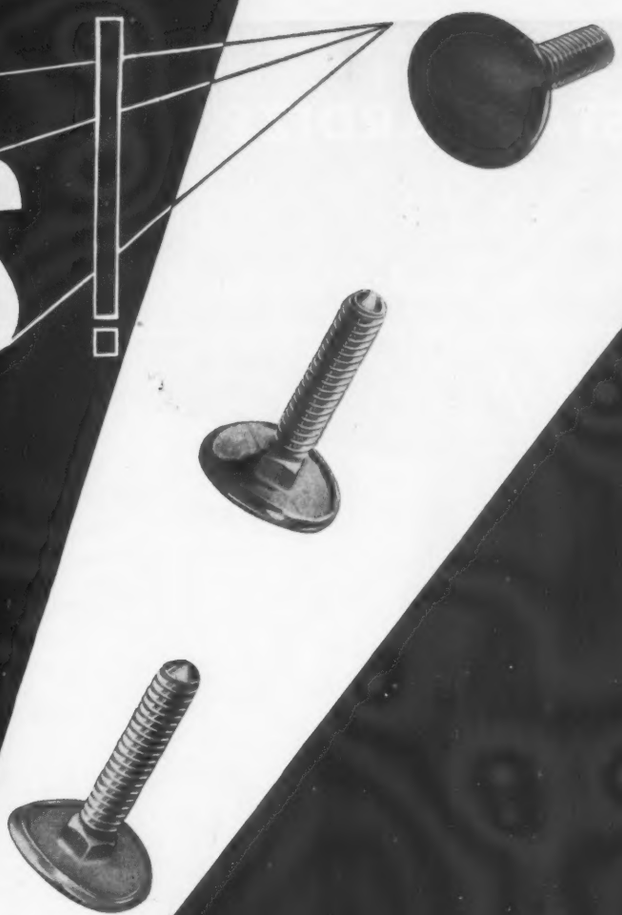
# SPECIALS!



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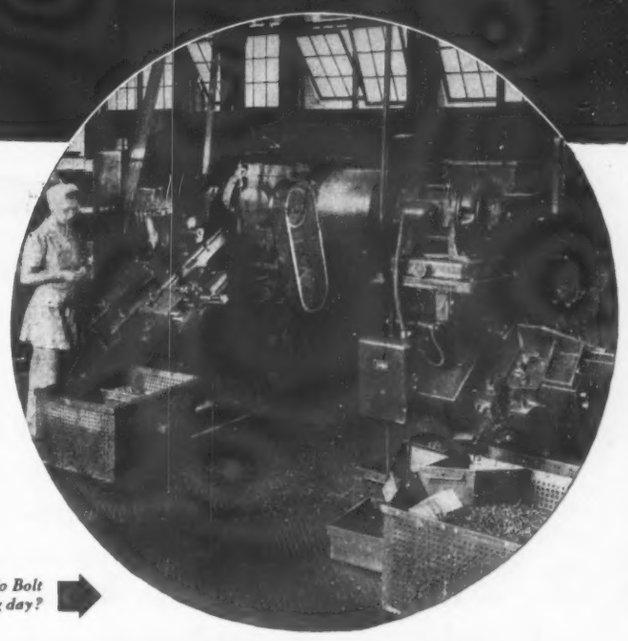
● Industry today, more than ever before, has a definite need for many different types of non-standard fasteners . . . fasteners of unusual sizes, shapes and materials . . . fasteners which must be custom-made to perform vital jobs in complex manufactured products.

Typical of these "specials" are the stainless-steel-headed bumper bolts illustrated above.

The fact that all circle B fasteners are controlled from billet to bolt in one single plant—*the largest independent in the country*—naturally makes the Buffalo Bolt Company the logical starting point for any producer with a nut or bolt problem.

Standard or special, all circle B products have the same uniform controlled quality that serves to make your production more efficient . . . less costly.



DID YOU KNOW *that each of this battery of Buffalo Bolt roll threaders has a capacity of 43,000 bolts per working day?*

# BUFFALO BOLT COMPANY

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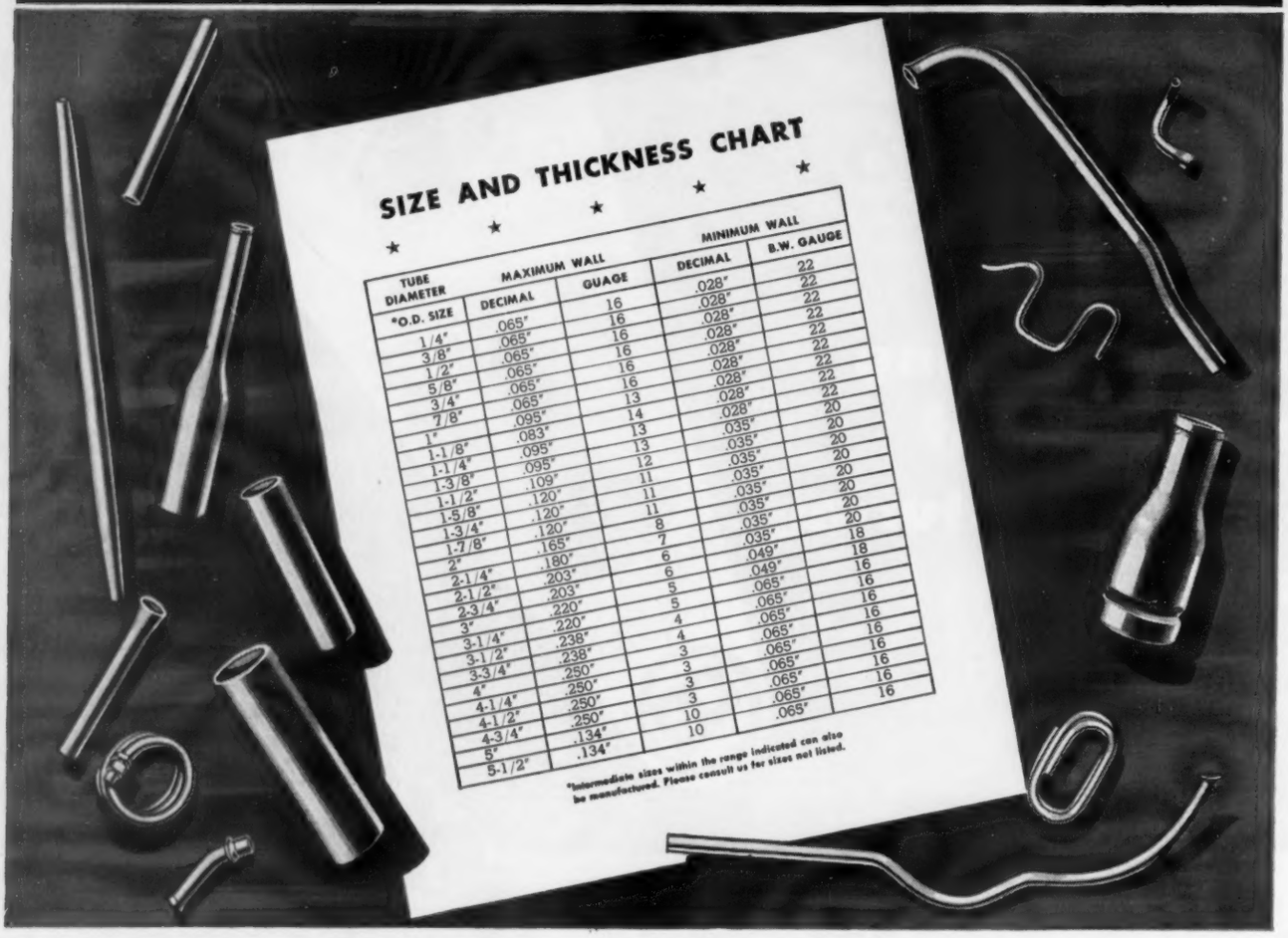
**Fabricated Tubular Parts for Mechanical, Pressure and Structural Applications**




With every year that passes, more and more manufacturers of products calling for ELECTRIC WELDED STEEL TUBING are discovering the advantages of specifying the "Standard" brand. They find that our wide variety of shapes and sizes, plus our facilities for high speed production afford them the means of getting the kind of tubing they want—when they want it. And they find that our interested and willing cooperation in the solving of special tubing problems helps them make their products quicker and at lower cost. These same advantages are available to you. If you are looking for a source of high quality ELECTRIC WELDED STEEL TUBING it will pay you to investigate our experience and facilities.

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*Welded Tubing* *Steel Forgings*

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# RESEARCH TEST ON THE HOT WORKABILITY OF STEEL....

PYROMETER
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RELAY
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Supports test bar but permits bar to move when expanding during heating
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Heating Element
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Standard three Jaw. 128 R.P.M.
FIXED END
Locked in place during test but movable to permit inserting and removing test bars

**Hot Workability Machine.**
**A method for determining the hot working properties of metals, developed by Globe.**

The use, by foremost research laboratories, of Hevi Duty Alloy 10 High Temperature Furnaces is again shown by Dr. Harry K. Ihrig, of the Globe Steel Tubes Co. Laboratories, in his research on "The Effect of Various Elements on the Hot Workability of Steel". (Metals Technology, Oct. 1945.) Because of their adaptability to research studies and their uniform, exact temperatures these furnaces are standard in most research laboratories where controlled heat to 2350° F is required. Their construction and use is detailed in Bulletin HD-339. Write for your copy — today.

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HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

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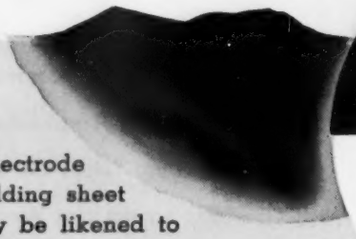
## *Burning* Question — Solved by Metal Spray



**P&H**

**"SM"**

FOR SHEET METAL WELDING

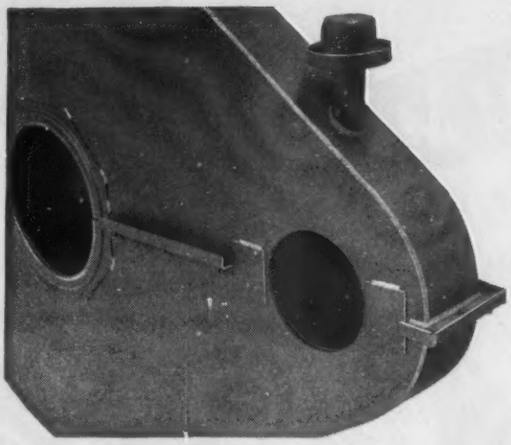
CLASS AWS-ASTM E-6013

"SM" is the new P & H electrode — spray type — for welding sheet metals. Applying it may be likened to "brushing on" weld metal.

"SM" reduces material spoilage. Its lower heat requirements eliminate the hazard of "burn-throughs" and "suck-ins". Removing slag is easier, chipping isn't necessary. The weld deposit is smoother and flatter, grinding operations are eliminated. "SM" is much easier to use—to produce the cleaner, stronger, more uniform welds. It cuts costs to the bone.

"SM" is a typical example of P & H welding research and development. Thoroughly tested and proved, it's the newest addition to America's most complete line of electrodes and arc welding equipment. Try "SM" on your work.

# use "SM" for all light gauge welding



This gear case of 12-gauge steel was tacked and welded throughout with "SM." Note the clean, flat beads which save expensive grinding and finishing. "SM" can improve the strength and appearance of your products — and save you money!

When welding such products as these oil pans of 16-gauge sheet metal, "SM" gives lower penetration — speeds up welding. "SM" is the perfect electrode for the fabrication of trailer and automobile bodies, tanks, heating equipment, vents or grills, farm machinery, metal lockers, galvanized sheet, etc.

| "AW-2B" | "AW-4" | "CM-50" | "DH-2" | "FW" | "AC-3" | "PF" | "AC-1" | "AP" |
|---|---|---|---|---|---|---|---|---|
| AWS E-10020 | AWS E-10012 | AWS E-7011 | AWS E-6020 | AWS E-6020 | AWS E-6013 | AWS E-6012 | AWS E-6011 | AWS E-6010 |

# call on P&H for all electrode requirements

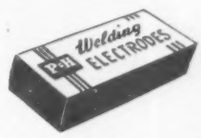
There is a P & H Electrode in the correct type and size for all mild steel applications as well as for welding stainless and alloy steels and for hard surfacing. Above are shown a few of the complete mild steel group.

## CONVINCE YOURSELF TRY P & H "SM"

AMERICA'S MOST COMPLETE ARC WELDING SERVICE

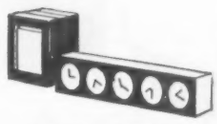
DC WELDERS

AC WELDERS




WELDING ELECTRODES

WELDING POSITIONERS



WELDING PRODUCTION CONTROL SYSTEMS

ELECTRIC HOISTS

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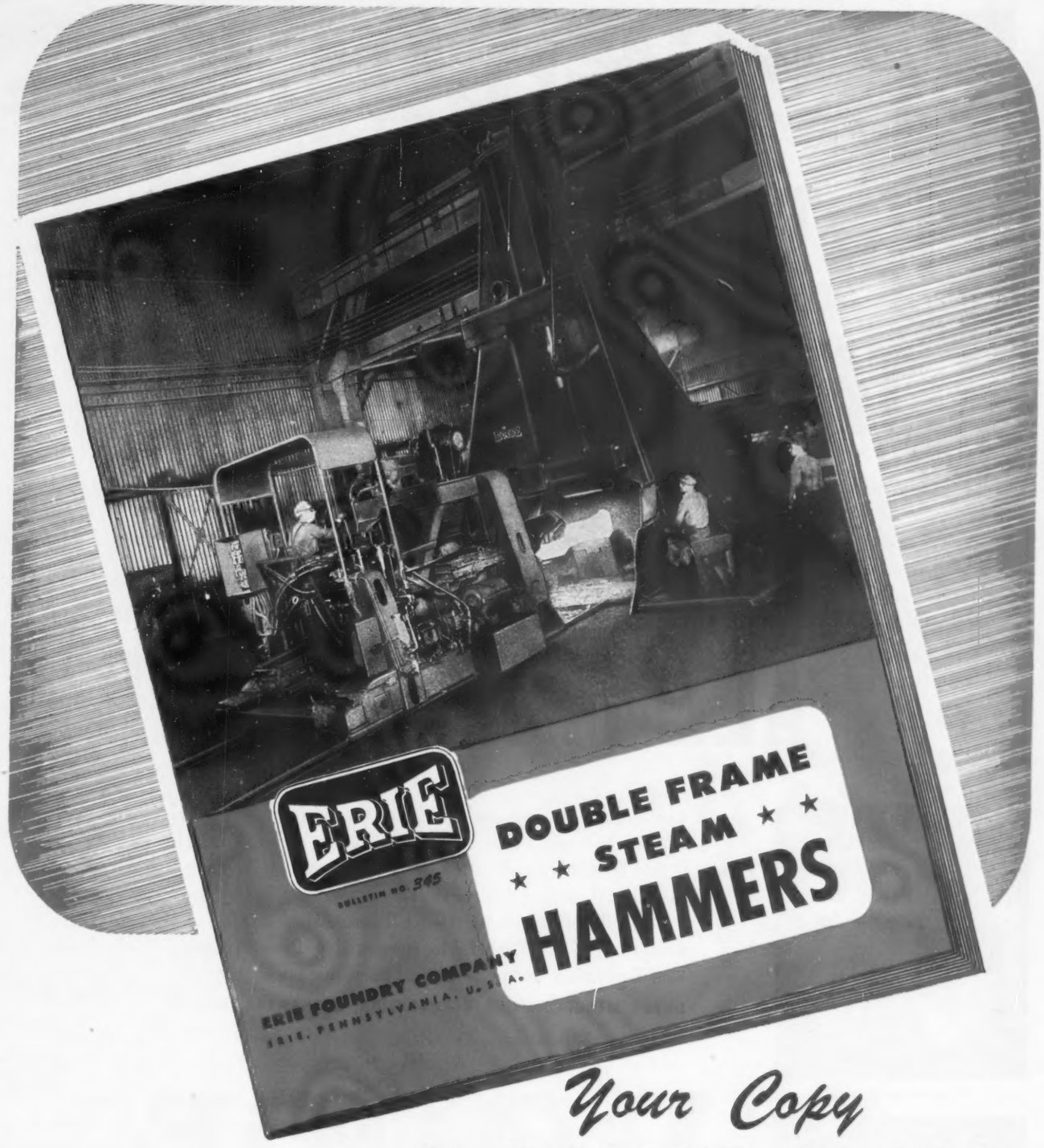
# THE SEYMOUR MANUFACTURING CO.

SEYMOUR, CONNECTICUT

In the 65 years that "Seymour" has manufactured nonferrous alloys, service has reached practically every metal working industry. In this period, three major wars have drawn heavily upon and greatly developed the usefulness of these alloys. Purchasing Agents should revise their records to include them as major elements of product design, and study their characteristics so as to be able to make accurate recommendations to engineering and mechanical departments. Glad to furnish information promptly.

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**FORGING HAMMERS**

*is ready for you*

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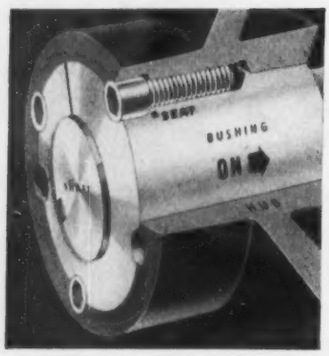
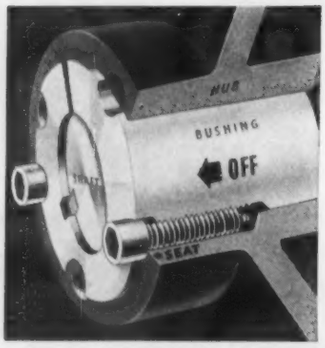
# TAPER-LOCK BRAND

# IS THE ONLY TAPER-BUSHED SHEAVE MADE IN ALL THESE SIZES




1. Tighten screw to install.




2. Tighten screw to remove.

THE TAPER-LOCK Sheave is available in Dual Duty sizes from 3 to 18 inch pitch diameter, 1 to 6 grooves inclusive; and in C and D sizes from 9 to 44 pitch diameter, 3 to 10 grooves inclusive. A total of 451 sizes!

For full details call the Dodge Transmissioneer, your local Dodge distributor. Look for his name under "Power Transmission Equipment" in your classified telephone book.

**DODGE MANUFACTURING CORPORATION, MISHAWAKA, INDIANA**

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***THE SYMBOL THAT CAME TO LIFE***

The man who walks into your factory wearing this symbol is the living embodiment of a service which gives you the correct answers to your problems in efficient mechanical transmission of power. He is the Dodge *Transmissioneer.*

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NAME PLATES

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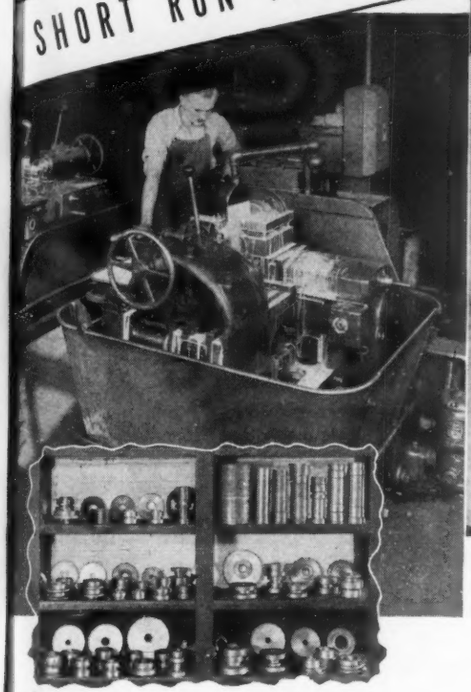
# How to apply Multiple Tooling and Automatic Cycling to TURNING JOBS

Whether your turning problem is a mass production job running into thousands of pieces . . . a short run of as few as 25 pieces . . . or a special turning job, Sundstrand engineers will show you how it can be handled to advantage on automatic lathes with quick cycle changeover. They will also assist in designing the most profitable processing method for the job at hand.

All of the advantages of multiple tool turning are available for both short run and mass production work with Sundstrand lathes. When the nature of the work is such that these standard automatic lathes cannot be tooled to handle the part, our engineers recommend and design special automatic lathes.

Described here are three typical cases in which Sundstrand "Engineered" Production assisted plant engineers in designing a tooling method which resulted in lower turning costs.

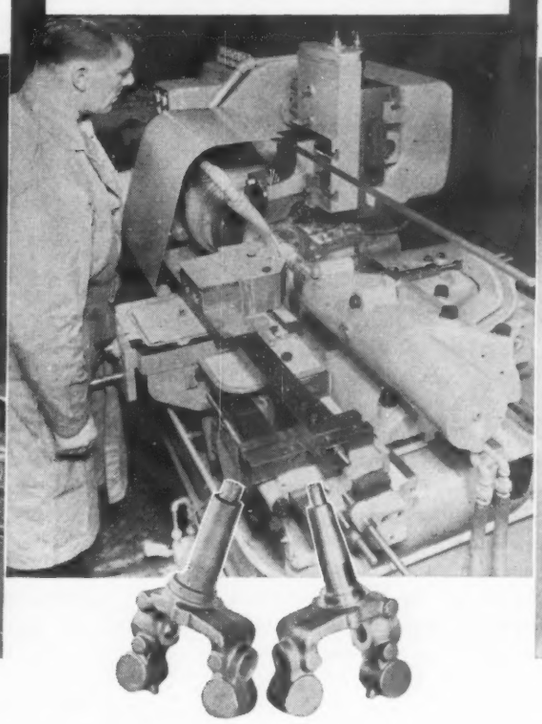
## 1 SHORT RUN TURNING



DUE to the quick changeover features of the Sundstrand automatic cycle, it is possible for this manufacturer to turn many of his jobs in lot sizes as low as 25. On one lot of 40 sleeves, his turning time was cut from 50 to 7 hours. Over 100 different parts are turned, including sprockets, pulleys, gears, etc., with lot sizes of 25 to 100 pieces.

Universal tool blocks, for adjusting tools to handle wide range of parts, keep tooling inventory to a minimum.

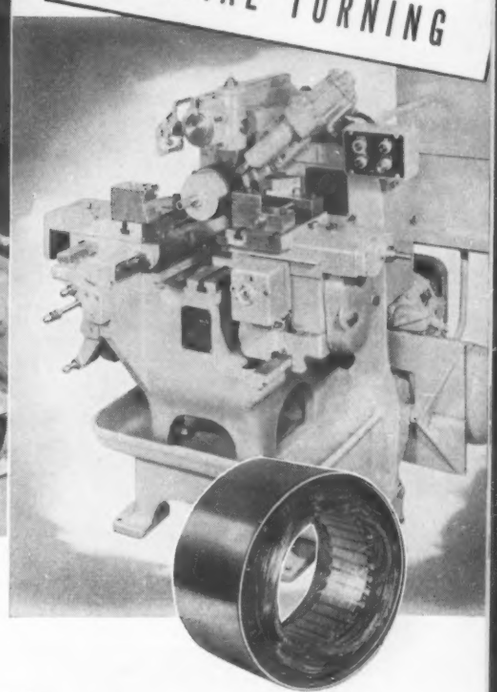
## 2 LONG RUN TURNING



SUNDSTRAND'S unique cycle control mechanism is remarkably simple and easy to adjust, Consequently, the time saved in setting up the machine is also desirable for turning long runs. Here's an example:

Six different steering knuckles are rough turned on this Sundstrand Model 12 Automatic Lathe. Operations include both straight and taper turning, facing and chamfering. With two complete sets of tool blocks, all parts are machined with a minimum of changeover time. Nine tools completely rough the stem end of the part in one machine cycle.

## 3 SPECIAL TURNING



HERE'S a special Sundstrand lathe which bores the I.D. of both ends, chamfers the I.D. and O.D. of both ends and faces the ends of a stator frame and coil assembly. Eight tools are used in this setup to complete the operation in one machine cycle. Machine and tool adjustments enable this equipment to be used on a number of different sizes of parts. A special short bed was provided so that operator position is convenient for loading, unloading and starting machine cycle.

MORE TURNING FACTS **Free**

This 44 page booklet, crammed full of technical data and production information shows how to apply multiple tooling to countless turning jobs. Short-run, mass production and special turning jobs are all included. Write for your copy today. Ask for bulletin 749.

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**2540 Eleventh Street, Rockford, Illinois, U. S. A.**

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These advantages can mean real economy, efficiency, and convenience in your plant. So investigate the Metal Fluoborates now by writing for technical data and trial samples of the products that interest you. As always, General Chemical's skilled Engineering and Technical Servicemen are available to assist you in preparing for test or full-scale runs.

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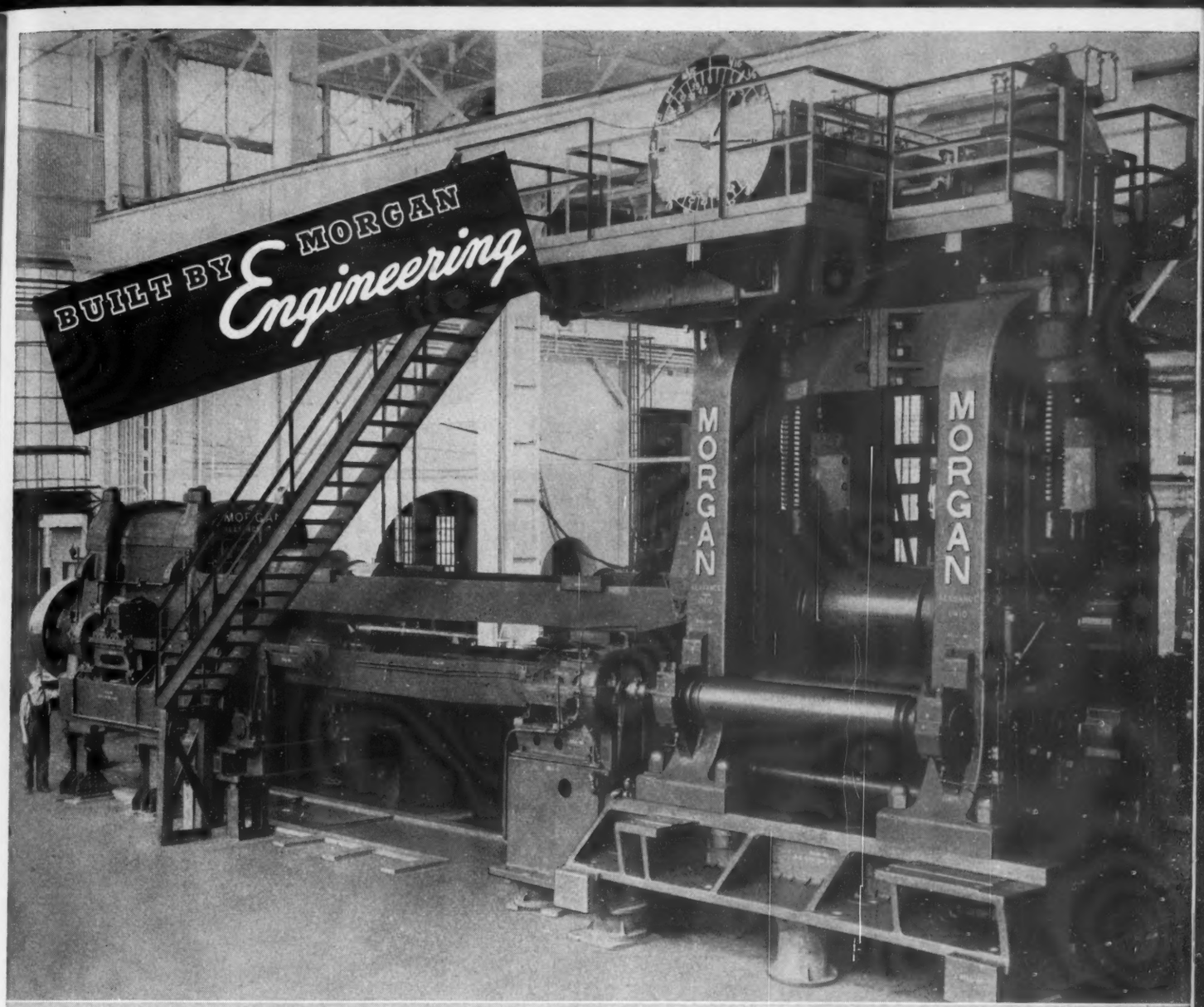
Available now . . . extensive operating data on the Metal Fluoborates in the technical manuals outlined here. For copies, write or phone the nearest General Chemical Sales and Technical Service Office listed above.

**Lead-Tin Alloy Plating MANUAL LT-1**
Full description of the practical, economical fluoborate method for plating lead-tin alloys in any desired ratio (particularly low-tin ranges) with high degree of uniformity and minimum of control measures.

**Zinc Fluoborate MANUAL ZF-1**
Covers high-speed plating with Zinc Fluoborate electrolyte from which zinc is deposited at higher rate than from other acid baths. Also explains tank and barrel plating on cast or malleable iron.

**Copper Fluoborate MANUAL CF-1**
Ready soon. Comprehensive details on Copper Fluoborate electrolyte which deposits copper at higher rate than any other known acid baths . . . without addition agents . . . with unusual simplicity of control.

**Metal Fluoborates BULLETIN 1015-A**
General information on Metal Fluoborates plus specific operating data on plating with Lead, Tin, and Cadmium Fluoborate.




**MORGAN "36" TWO-HIGH BLOOMING MILL**

Above is shown a Morgan 36" Two-High Blooming Mill on erecting floor. Housings are one piece steel castings of the closed top type. Top roll balance is of the counterweight type. Top roll lift sufficient for rolling 42" wide slabs. Manipulator is of the overhead type, compact and accessible. Tables are of heavy design, equipped with anti-friction bearings.

With this Mill was furnished Auxiliary Equipment as follows — Front and Rear Tables with Manipulator — Approach Table — Ingot Buggy — Runout Tables — Slab Shear with Gauge — Crop Hoist — Pushers — Conveyor — Skid Bed and Furnace Tables.

## THE MORGAN ENGINEERING CO.

ALLIANCE, OHIO. 1420 Oliver Building, Pittsburgh

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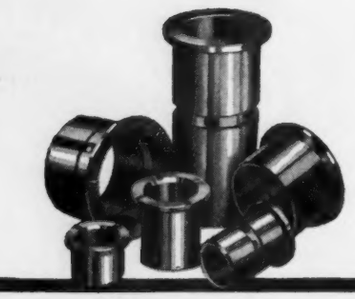
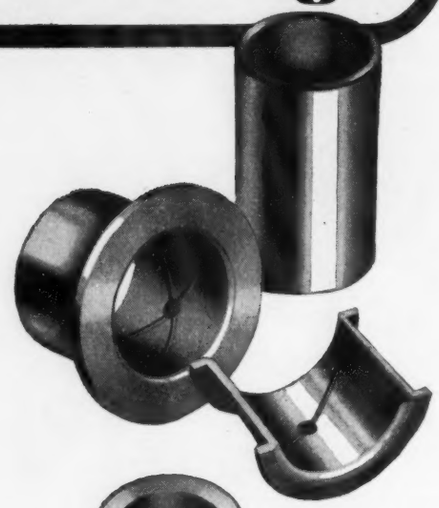
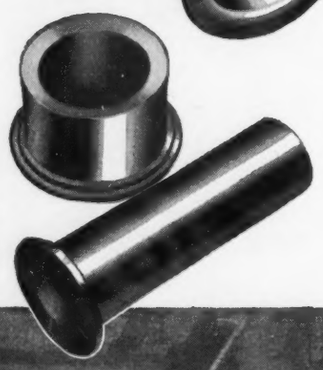
# ONE RIGHT SOURCE

## *for* Sleeve Type Bearings







There are several reasons why many leading manufacturers regard Johnson Bronze as the RIGHT source for *all* their Sleeve Bearings. For instance, we are the only bearing manufacturer that produces ALL types of Sleeve Bearings. This enables us to help the purchaser select the correct bearing for each application. It permits us to give sound bearing advice . . . based on facts . . . without prejudice for any one type. Every bearing we produce is manufactured complete in our plant . . . from molten metal to finished product. Thus we have constant control over every step in the process. We manufacture only one type of product . . . Sleeve Bearings. All of our facilities, our resources and research has but one objective . . . to give our customers better bearings at lower cost. Isn't this the type of bearing service you have been looking for? Your inquiry carries no obligation . . . why not write TODAY?

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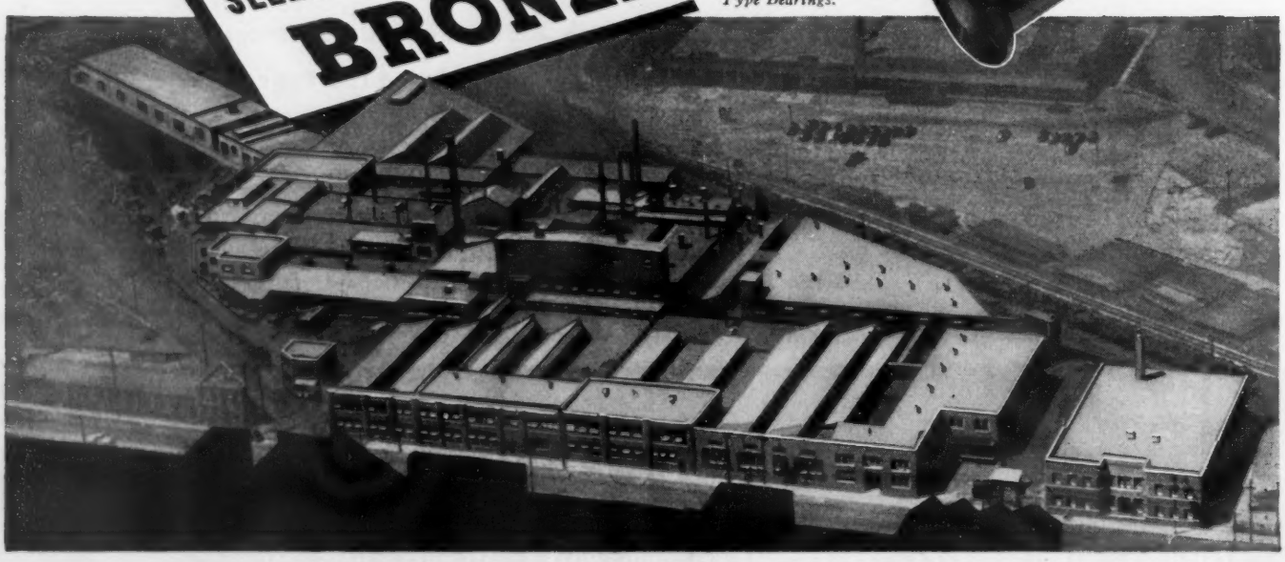
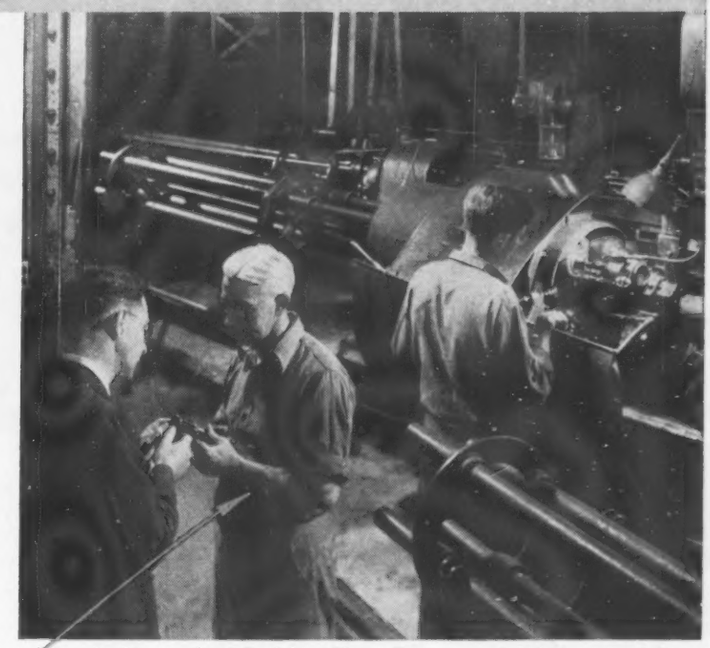


# "With Gulf Electro Cutting Oil we get more production per tool grind"

says this Foreman



Actual photo of a Machine Shop Foreman (right) consulting with a Gulf Lubrication Service Engineer on results with Gulf Electro Cutting Oil in machining various parts on automatic screw machines.

"When we switched to Gulf Electro Cutting Oil, we noted an immediate improvement in the overall efficiency of our automatics," says this Foreman. "We credit this oil particularly for a big increase in production per tool grind—it helps keep our tools sharp."

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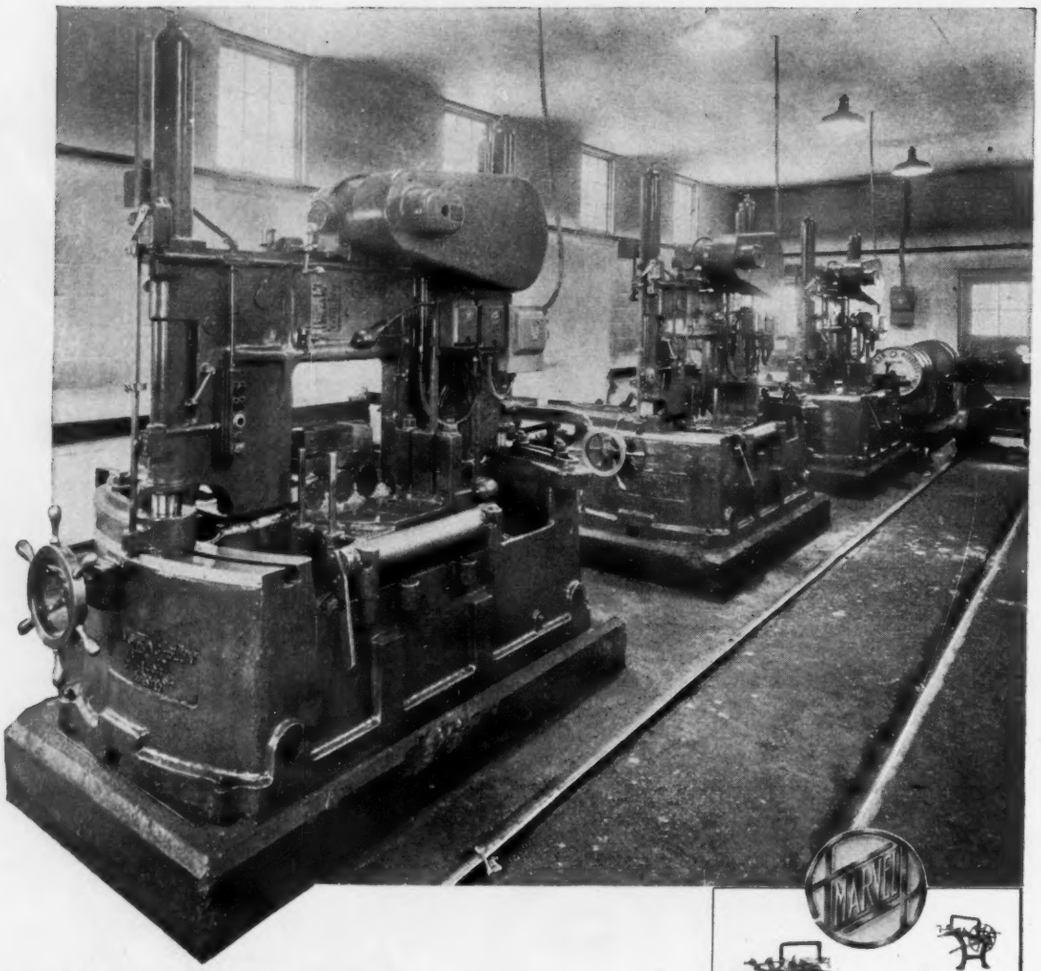

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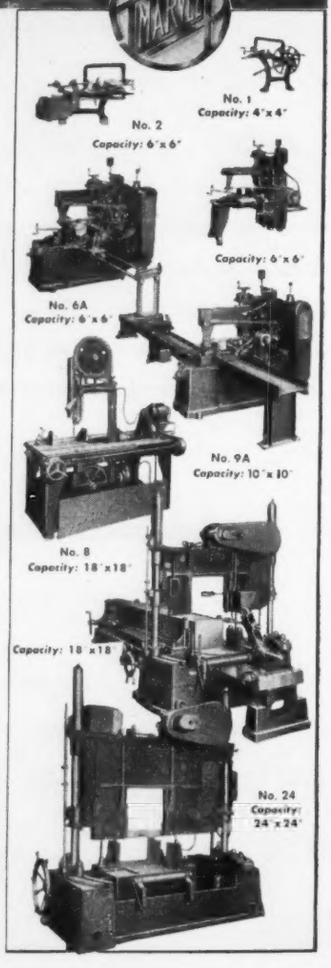


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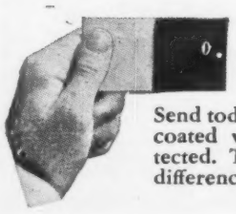

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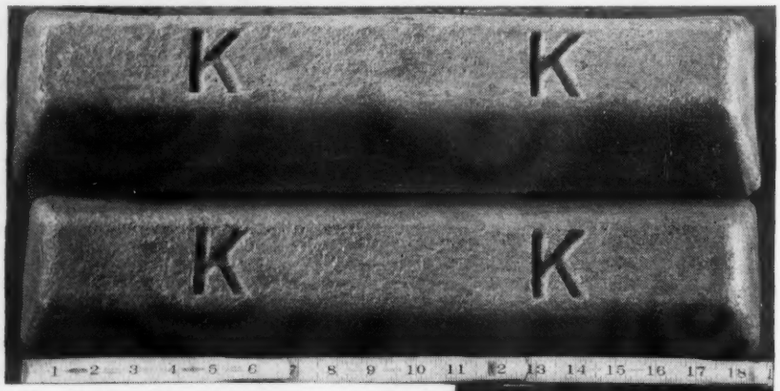

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Above—Prime Coat Hydro-Filter Spray Booths and up-tunnel to Prime Coat Baking Oven located above. At right—Illustration with outer housing removed showing arrangement of major units

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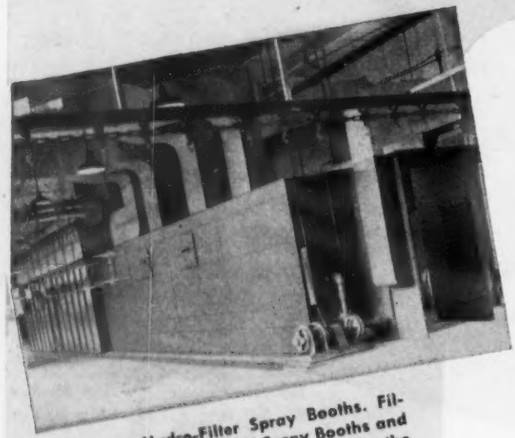

Final Coat Hydro-Filter Spray Booths. Filtered air is supplied to all Spray Booths and maintained at a slight pressure inside the booth enclosure.

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# STEEL

*The Magazine of Metalworking and Metalproducing*

VOL. 118, NO. 22 JUNE 3, 1946


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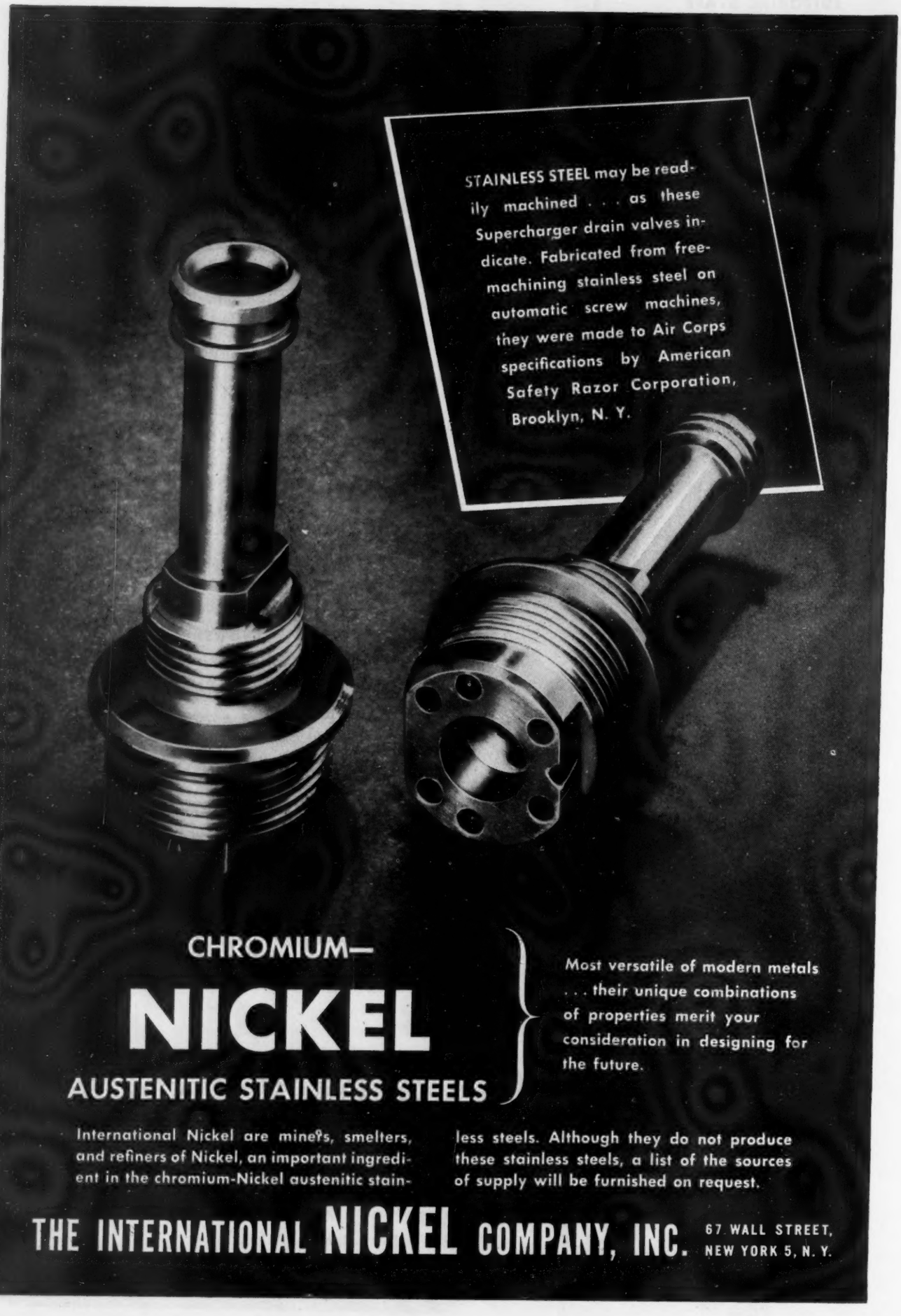
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# As the EDITOR VIEWS the NEWS

## The Lesson of Japan

No one who is familiar with the results of industrialization in the United States can be in Japan for more than an hour without realizing that there is something wrong with the industrialization of this land of the rising sun.

In Tokyo and Yokahama one gets the immediate impression that certain symbols of a 1940 American economy—such as abundant electric power, modern office buildings, efficient electric transportation and fairly modern iron, steel, metalworking and chemical industries—have been superimposed upon a civilization for the masses which in many respects is inferior to that enjoyed in the United States in 1850.

This incongruity is apparent everywhere. In front of Tokyo's Dai-Ichi building, whose banks of elevators and marble corridors compare favorably with those of modern buildings in American cities, native traffic consists of pedestrians tramping on wooden clogs or crude shoes, push carts, horse and ox-drawn vehicles, bicycles, an occasional native automobile or truck and overloaded street cars. Most of the houses are small and of flimsy construction, although many are wired for electricity. A square mile of bombed-out residences yields only a few hundred pounds of metal, indicating that the furnishings of the average Japanese home are simple and primitive.

The sharp contrast between the low standard of living and the high state of development of industry is emphasized by an inspection of plants in the iron, steel and metalworking industries. Japan had an ambitious program for expanding these industries. There are a number of modern and highly efficient iron and steel production units, as well as many that are on a par with installations of the twenties in the United States. With numerous fabricating and manufacturing plants, they constituted a well balanced arsenal for war.

It is significant that the efforts of the Japanese to achieve a high degree of industrialization have had such a negligible effect upon the standard of living of the people. Most of the benefits that usually accompany the industrialization of a nation have been denied the citizens of Japan. Judged by the American concept that industry's objective is to produce more goods more efficiently for more people, Japan's attempt at super-industrialization has been a dismal failure.

This should be an object lesson to those in the United States who are fighting to preserve the system of private enterprise. The more effectively it can be made to serve the public, the less vulnerable it will be to attack.

STEEL
June 3, 1946

**MAKE HASTE SLOWLY:** Strong, positive governmental action is required to remove the throttling hand of organized labor from the throat of the nation's economy. If the American private enterprise system is to survive nothing less will suffice. The power of the labor barons must be curbed if economic sanity is to prevail.

It is debatable, however, whether the drastic legislation urged by President Truman, even though labeled as temporary, is the answer to the public clamor for relief from the intolerable conditions which have harried the nation since the end of the war last summer. While sympathizing with the President, and admiring his courage in sponsoring a measure loaded with so much political dynamite, one cannot but hesitate to accept a program so replete with potentialities for danger to the American economic system.

Consider what is proposed. The bill would grant powers to the President beyond those ever granted before in peacetime, and possibly in wartime. Not only would it draft strikers for labor service in gov-

(OVER)

ernment-seized plants and industries, but it would empower the government to fix wages without consent of either management or labor, to confiscate profits, and it would put the government in position to break and destroy any business and any union.

Doesn't this smack of totalitarianism? Might not enactment of such a measure play directly into the hands of those who for years have been insidiously sponsoring an economic revolution here?

We should make haste slowly. Correct government mistakes in labor legislation and policy of the past 13 years by all means, but in doing so let us not, in the hysteria of the moment, legislate what might turn out to be the eventual doom of our system. —p. 73

• • •

**TIMELY MEETING:** No group is closer to the economic pulse of the nation than the thousands of industrial purchasing agents who keep materials flowing without interruption into the huge maw of American industry.

The industrial purchaser's task was one to test the mettle of the best throughout the war. Today, he faces no less severe a task.

Little wonder, therefore, thousands of purchasers last week traveled to Chicago in the face of threatened transportation difficulties to attend the annual meeting of the National Association of Purchasing Agents. The meeting was extremely timely, affording an opportunity for purchasers to hear and discuss with top-ranking buyers and government control authorities problems common to all purchasing departments in these hectic reconversion days. —p. 78

• • •

**DOUBTFUL ASSET:** Reports of technical investigating teams sent into Germany after the war are liberally sprinkled with accounts of new processes and machines to implement them. Apparently, the German industrialist of recent years was as eager as his prototype to back a "better way." But some of the reports dealing with metalworking industries leave the unmistakable impression that dimentional accuracy and finish of products fall short of the highest American standards.

Perhaps such conditions are phenomena peculiar to wartime, and in contrast to the technical excellence found in other fields of German science, but Allied reporters repeatedly stress that country's reliance on an abundant supply of cheap labor, with the incentive for refinement of process or machine correspondingly lessened. However, this is but a part of the entire picture; for example, due credit should be given the German engineer for conceiving such interesting and potentially useful methods as the hot extrusion of steel tubing as practiced at Annen, Germany. —p. 126

**SIGNS OF THE TIMES:** Major reforms which should hasten patent procedure materially are in the making (p. 82) under Patent Commissioner Casper W. Ooms. Of immediate importance is adoption of a standard simplified application form, a reform talked about for years but about which little was done until now. . . . Building up a reserve of machine tools and other equipment (p. 83) for use in the next national emergency is meeting with only fair success. So far about 5000 tools have been located and earmarked for storage and some 35,000 are still being sought in various Army-owned establishments. . . . Long heralded automotive golden jubilee unfolded its sights and sounds (p. 89) to waiting thousands at Detroit last week. Highlight of a 3-hour parade was a fleet of 250 ancient and honorable automotive vehicles, about one-third of them operating under their own power. . . . Sale of the government-owned Geneva steelworks to United States Steel Corp., if approved by the Justice Department (pp. 80, 94), will receive the blessing of western industrial and business interests. Opposition to acquisition of the plant by United States Steel appears to have faded materially in the area though efforts are being made in Congress to delay final approval of sale pending possible reopening of bids. . . . Several weeks ago the Kaiser interests failed to enter a bid for a government-owned steel plant at Chicago but this evidently didn't mean that Henry Kaiser had abandoned the idea of getting into the steel business in the Middle West. At any rate it was announced last week (p. 80) that Kaiser-Frazer had agreed to purchase a substantial interest in a new steel company being formed to take over existing facilities of a "Midwest steel plant with a large productive capacity." The new company or the plant to be acquired were not disclosed. . . . Drought of copper, caused by strikes in mines and refineries and restrictive effects of price ceilings, is growing more acute (p. 75) and June supplies will be only 20 per cent of requirements. Relief in the way of higher prices and settlement of protracted labor disputes will ease the situation, but weeks will be required to fill pipelines to consumers. . . . Despite tremendous strides in development of man-made materials of extreme hardness, without a constant supply of natural diamonds (p. 111) industry would be unable to carry on many vital operations.

E. L. Shaner

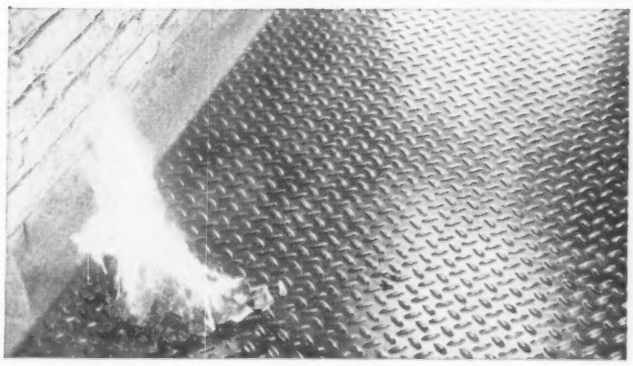
EDITOR-IN-CHIEF

# . . . with Inland 4-Way Floor Plate

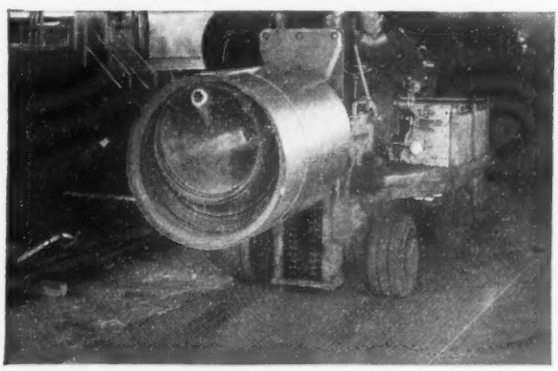
Any step by an employee that results in a slip or fall has its effect on your profit. The most important movement in your plant is—Production Steps! Steps that must be protected.

Farsighted management looks to Inland 4-Way Floor Plate, relies on it to safeguard those Production Steps . . . it's the sturdy faithful guardian of the men who "man" the production line.

Inland's safety floor plate, with its four-way lug provides a sure grip traction for foot and wheel on floors, walkways, ramps, platforms and steps—any place where accidents could occur.



*Inland 4-Way is a protection against fire and heat—will not burn, warp or splinter. Cleans easily, drains freely, paints attractively.*



*Year after year, Inland Floor Plate carries heavy loads, stands up under the most punishing service.*

Made of hot rolled steel, Inland 4-Way Floor Plate practically eliminates maintenance—it won't burn, warp, crack, splinter or absorb liquids and odors. Easily installed and the essence of economy—once placed, Inland 4-Way Floor Plate is there to *stay!* Write today for your copy of the Inland 4-Way Floor Plate catalogue!

**Inland Steel Company, 38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.**

# INLAND STEEL COMPANY

**OTHER PRODUCTS: BARS • STRUCTURALS • PLATES • SHEETS • STRIP • TIN PLATE • PILING • REINFORCING BARS • RAILS • TRACK ACCESSORIES**

# *Ryerson—Quick Source for*

# INLAND 4-WAY FLOOR PLATE

Take a careful look at this close-up of Inland 4-Way Floor Plate. Note the 4-way projections.

Now read of the advantages Inland 4-Way Floor Plate provides:

**1.** *Safer traction* on walkways, stairways, around machinery and wherever sure footing is important. The 4-way projections grip feet or wheels from every angle. Give 4-way protection against dangerous falls.

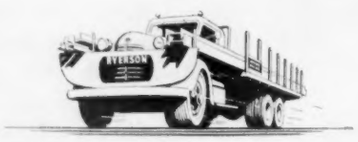
**2.** *Longer wear.* Inland floor plate is rolled from tough, open hearth steel with high wear resisting qualities.

**3.** *Great structural strength.* The overlapping projections reinforce lengthwise and crosswise giving Inland 4-Way Floor Plate greater stiffness. It has a tensile strength of 55,000 lbs. and an elastic limit of 35,000 lbs. per square inch.

Then you get the additional advantage of a continuous pattern that is pleasing in appearance; matches whether laid side to side or end to end and permits sweeping and drainage in four directions.

Inland 4-Way Floor Plate is available for quick delivery from Ryerson Steel-Service Plants, in two pattern sizes and several thicknesses. Write for catalog and samples too if you care for them.

JOSEPH T. RYERSON & SON, INC. Steel-Service Plants at: Chicago, Milwaukee, Cleveland, Cincinnati, St. Louis, Detroit, Philadelphia, Pittsburgh, Buffalo, Boston, New York.



**NEED TUBING?**

Ryerson stocks of seamless mechanical tubing, boiler tubes and Allegheny Stainless tubing are large and complete. Contact nearest Ryerson plant for prompt delivery.

# RYERSON STEEL

*President Truman is shown addressing the joint session of Congress in which he asked immediate enactment of legislation to stop the wave of strikes which has crippled industrial production since the war's end. NEA photo*

# Steel Mills, Consumers Will Feel Strike Effects Throughout Year

***Several weeks to be required to build up inventories of raw materials and resume near-normal operations. Shortages and unbalance in users' stocks will take months to overcome. New labor legislation, spurred by President's proposals, awaited***

THREE to four weeks will be required by the iron and steel industry to make a reasonable recovery from the effects of the coal strike after the miners resume work. Effects of the coal, steel and other work stoppages, however, will be felt by consumers throughout the remainder of this year and into next.

Approximately 12 million tons of steel production already has been lost due to the steel and coal strike alone and this loss will mount before full operations are resumed. Mill schedules have become seriously unbalanced and will present difficulties for weeks to come. Consumers' inventories are depleted and unbalanced and great pressure will be exerted on the mills to build up and balance these stocks.

Steel mill operators are in a relatively worse condition now than at the end of the steel strike. At that time raw materials stocks were in good condition and the problem was largely one of getting facilities in shape and started. Now, however, stocks of coal, coke, scrap and in some cases iron ore are low and must be built up before normal operations can be attained.

Ingot operations last week receded only two points to 43 per cent of capacity as steelmakers, anticipating an early resumption of coal mining, attempted to keep as many facilities in production as possib'e. The pinch of raw materials supplies was increasingly in evidence and will be felt for several weeks after mining is resumed.

Shortages of raw materials has forced Lukens Steel Co., Coatesville, Pa., to close its plants and offices for the first time in its 136 years of business. The company and its subsidiaries will be closed until June 8 and 5000 employees will be idle. Lukens shut down the first of its 10 open hearths on May 12, and on May 19 three more units were banked in the hope that dwindling supplies could be augmented so that the company could continue in partial operation. With most blast furnaces out of blast and suppliers of other raw materials crippled by strikes, "the decision to close was forced upon us," according to Robert W. Wolcott, president

American Steel & Wire Co., subsidiary of the United States Steel Corp., announced it will close its cold roll department at the company's Cuyahoga works in Cleveland and give employees their two-week vacations starting June 3.

"This move is a direct result of the coal strike," explained H. B. Jordan, vice president in charge of operations. "Inasmuch as we have no steelmaking facilities in Cleveland we must rely on outside sources for the hot-rolled strip which is cold-reduced at Cuyahoga. Our inventory of semifinished material will be gone by this weekend and our supplier is not in a position to replenish our stocks due to lack of steel."

In the Pittsburgh district, operations

dropped to 26 per cent of capacity. U. S. Steel subsidiaries in the district were operating at 8½ per cent.

While industry and labor lick their financial wounds inflicted during the unprecedented flood of work stoppages since the war, the cost—to industry and labor—was being figured in billions of dollars in lost production and lost wages.

And the end is not yet in sight—even for those companies which have settled labor disputes with their own employees. This is illustrated by the experiences of two leading auto manufacturers.

Ford Motor Co., whose workers have not carried out a single strike since the war's end, has lost $500 million in lost sales possibilities and company employees have lost $237 million in wages as result of shutdowns and slowdowns caused by strikes in suppliers' plants and by materials shortages caused by the steel, coal and other stoppages.

General Motors Corp.'s operations currently are being curtailed by strikes in the plants of 142 suppliers. These stoppages, says the company, are holding down production to about one-third of what it should be at this time.

The experience of Ford and General Motors is typical of that of the metalworking industry generally. Shortages of materials or components, due to strikes in other plants, have been throttling production since early in the year.

Little optimism can be found that this situation will be cleared up with settlement of the disputes in major industries.

Antistrike legislation asked of Congress to break the railroad strike and now being studied by Congress probably will not prevent many of these stoppages from being called. Among those scheduled is a strike by the maritime workers to start June 15 and by the anthracite coal miners. Strike notices have been pouring into the Department of Labor at a rate of nearly 1000 a month.

Principal speculation on the effect of whatever antistrike legislation is adopted as a result of President Truman's request to Congress now hinges on how such measure or measures will affect the second large wave of postwar strikes expected to start early next year when many present agreements run out. Union leaders already are formulating plans and demands to be presented then and indications are that they may make the guaranteed wage an issue at that time.

After the first wave of enthusiasm for action—any kind of action to break the paralyzing strikes—that greeted President Truman's proposal for drastic temporary labor legislation which would outlaw strikes against the government, sentiment cooled rapidly. Although the House quickly passed the recommended legislation, providing for drafting into the Army of strikers in government-held plants and the transfer of all profits of such plants under government control to the Treasury Department, the Senate deferred action until it had passed the Case bill.

*Sen. Wayne Morse (Rep., Oreg.), right, and Sen. Sheridan Downey (Dem., Calif.) discuss the President's proposal for antistrike legislation. Senator Morse called the Chief Executive's appearance before the joint session of Congress "a cheap exhibition of ham acting" while Senator Downey branded the labor law request as comparable to the acts of Hitler and Mussolini. NEA photo*

Many senators and outside observers found serious objections to the President's proposed legislation. It gave, they believed, unnecessary power to the administration, which if unwisely used, might uproot the American system. Further, they reflected, much of the labor difficulty which has been inflicted upon the country in recent years has been caused not so much by laws as by government labor policy and by interpretation of the Wagner Act and other laws by strongly pro-labor administrative bodies.

However, the President's proposal brought to a head the demands for more balanced labor legislation and quite possibly may have provided the impetus necessary for a thorough overhauling of labor legislation.

## "Super Seniority" for Returned Vets Denied

"Super seniority" for veterans of World War II was denied by the United States Supreme Court last week in a 6 to 1 decision which held the Selective Service Act does not guarantee preferential seniority to returned veterans.

The case in point involved a welder, Abraham Fishgold, employed by the Sullivan Drydock & Repair Corp., Brooklyn, from December, 1942, until his induction in May, 1943. When Mr. Fishgold was discharged the company restored him to his former position in August, 1944, with all the seniority he would have accumulated during his military service. However, when employment had to be reduced, the company declined to give him "super seniority" as a veteran over workers with longer service than he.

The Supreme Court held the company acted properly and in accordance with the law. The decision contradicts the position taken by Selective Service Director Lewis B. Hershey.

## Finished Steel Shipments Decline During March

Shipments of steel products by the industry during March totaled 4,644,988 net tons, compared with 5,184,498 tons in February, according to the American Iron and Steel Institute.

Total shipments for first quarter were 9,446,288 tons, compared with 16,803,685 tons in the comparable period last year.

# Copper Shortage Growing More Acute

***Strikes in mines and refineries, combined with restrictive effects of price ceilings, virtually have dried up supplies. Price relief to be offered by OPA, permitting granting of wage increases and settlement of labor disputes***

THE drought of copper, and to a lesser extent of other nonferrous metals is growing steadily more acute and this month will result in shutdowns of some manufacturing plants and drastic curtailments in other.

The supply of copper bars for June will be the lowest in several years and wire makers will receive not more than 20 per cent of their requirements, according to Civilian Production Administration estimates. Only about 10,000 tons of copper bars are expected to be available this month, against requirements for 50,000 to 60,000 tons. In April, about 31,000 tons of copper bars were available and in May, about 17,000 tons.

This drying up of the copper supply already has cut sharply into the manufacture of small electric motors, wiring for new homes, and a wide range of consumer goods, such as refrigerators, sweepers, washers, radios, electric fans, irons, and a variety of industrial goods, such as power tools.

Manufacturers of these items have reached the bottoms of their stockpiles and many face the necessity of closing this month. Some companies have arranged for employees to take their vacations this month and will shut down the plants during the vacation period.

The shortage in copper arises primarily from strikes and from price ceilings.

In January the mines producing most of the nation's copper were closed by strikes. In February the refineries turning out most of the refined copper were shut down by labor disputes. Many of the largest copper-processing plants were out of production for a long time. These strikes generally were crowded off the front pages by work stoppages in the automotive, electrical and steel plants and more lately the coal mines, but they practically cut off the flow of this vital metal to consumers' plants. So serious has the situation become that even when all strikes are ended and production resumed by mines and refineries, consumers can expect no relief for at least a month or six weeks.

A companion cause for the shortage is found in the price ceiling imposed by the Office of Price Administration. Prices have been held at 12 cents a pound (electrolytic, Connecticut Valley) despite rising costs and despite higher prices paid for import copper. Wages, supplies, equipment costs and taxes have advanced since the price ceilings were established. These increases are reflected in the 1945 statements of the copper companies. Another factor in increasing costs has been a shortage of labor which has not permitted the mines to operate at capacity.

Strikes and labor shortages also have affected the supply of foreign copper available. Last week, the open pit mine of the Chile Copper Co. in Chile, subsidiary of the Anaconda Copper Co., was closed by a strike. This is one of the largest copper mines in the world and one of the main sources of supply for the United States.

Mines in Chile and Peru have consistently reported labor supply has been insufficient to operate mines at an economically high level.

Price relief was in the making last week and OPA was reported readying a new schedule lifting the price from 12 to 14⅜ cents a pound. Part of this increase is intended to compensate for wage increases granted by some mines and refiners and being demanded of others and also to compensate for costs already absorbed.

### New Prices for All Producers

A two-band price system of price increases for nonferrous metals which recently was being studied by OPA reportedly has been abandoned and the new prices, when announced officially, will apply to all producers.

A number of strikes in the copper industry recently have been settled. Anaconda Copper Co. granted an 18½ cent hourly increase to its workers. American Brass Co. resumed operations at Buffalo and Raritan Copper Works at Perth Amboy, N. J., settled a 12-week strike by granting a 18½ cent wage increase and other concessions.

An acute shortage of lead also has been retarding production in metalworking plants. This is blamed by trade authorities on the controls imposed by the government.

"There would be no lead shortage today if a free market in lead were operative as in prewar days," says Felix S. Wormser, secretary, Lead Industries Association. "Then the price would rise sufficiently to encourage greater world production or a search for new ore deposits and simultaneously discourage its use in numerous applications where substitutes would be cheaper. The shortage today is purely artificial."

Mr. Wormser estimated that annual lead requirements in the United States are about 1,000,000 tons a year. Production in 1946 from domestic mines will be about 350,000 tons. To make up the deficit, imports are necessary.

Under government subsidy program, according to Mr. Wormser, the domestic price has been held lower than the import price, thus making imports prohibitively costly.

Higher prices of lead also were reported in preparation by OPA. These, it is expected, will raise the price from 6.50 cents a pound (New York) to 8.50 or 8.75 cents.

To cope with the acute copper shortage, manufacturers have resorted to various expedients, such as redrawing used trolley wire or stripping insulation from used magnet or electrical wire, all of which, of course, are costly.

How the copper shortage is affecting consumers in the various industrial dis-

### POSTWAR WORLD

**Difficulties of achieving full production and full employment in this postwar age of strikes and shortages were portrayed by General Electric Co. in advertising in leading newspapers. GE, whose plants were closed for weeks this spring by a strike of its own employees, explained that its plans to keep its 140,000 workers turning out the goods consumers need and want are being frustrated now by materials shortages.**

**"One of the worst problems right now is copper," reads the ad, which shows a nearly empty spool of copper wire captioned "When this is gone, we'll have to quit."**

**The ad explains how work stoppages virtually have stopped the flow of copper and why it is impossible for the company to continue in production and provide jobs until supplies are replenished.**

tricts is indicated by the following brief reports from STEEL's district editors:

**ST. LOUIS** — With pipelines nearly emptied by strike shutdowns, copper consumers are in the shortest supply in history. Normally, stockpiles average 90 days; now they are less than 30 days. Manufacturing plants are shifting to aluminum and steel substitutes wherever possible. Some fabricators also are hit by strikes. They predict that short fuel supplies and depleted ore sources will aggravate the situation in the months ahead.

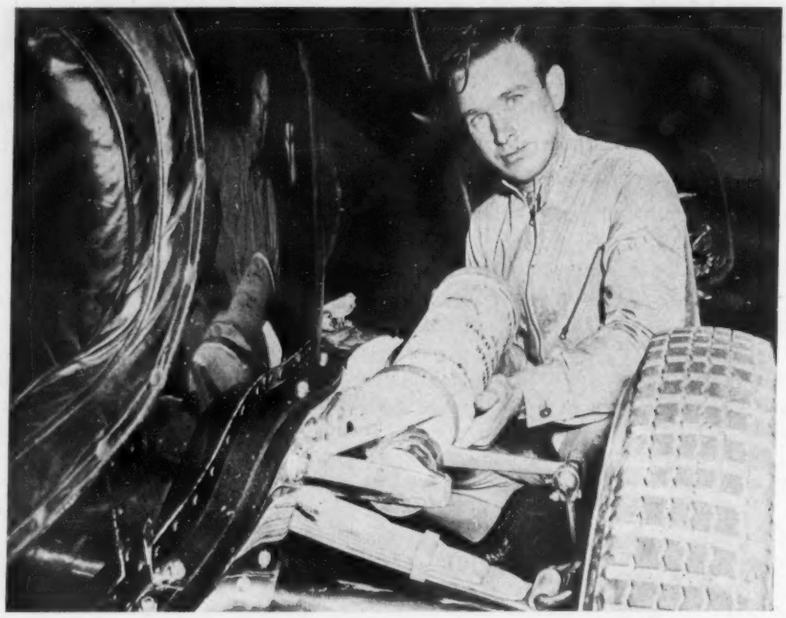
**LOS ANGELES**—Shortage of copper in southern California is termed "desperate" by consumers. Virtually the only source open to smaller consumers are the stocks of the War Assets Administration, and this source is uncertain. One motor maker is stripping the insulation from No. 7 magnet wire, an operation which costs 8 cents a pound. Only a trickle of copper is reaching here from Mexico.

**TORONTO, ONT.** — Canadian copper supply is extremely tight and consumers report difficulty in obtaining any supplies. A large amount of work is being held up through the shortage and some consumers still are waiting delivery on orders placed last October. The shortage is acute in all classifications. Wire is especially scarce and is holding up the building program.

**SAN FRANCISCO**—Copper consumers in this area are scratching the bottom of the barrel and fabricators now are on a day-to-day basis. Unless supply increases soon, which appears unlikely, a nearly complete shutdown of fabricating plants will occur this month.

**YOUNGSTOWN**—Falcon Bronze Co., large producer of copper and bronze steel plant parts, reports it has copper supply adequate for three or four months, having made commitments well in advance. Local steel plants report no trouble in getting copper for use in steel; they are using copper scrap or copper-bearing steel in open hearth mix. Steel plants report copper and bronze parts hard to get.

**CLEVELAND**—Large users of copper and copper products are having difficulty in obtaining sufficient supplies to maintain operations but only a few shutdowns can be attributed to this shortage. The most common complaint is that of unbalanced inventories. For example, some departments in plants producing generators and motors have been closed occasionally during the past year due to lack of certain gages of copper wire or sizes of copper bars. Deliveries are extended well into the future with some 16 to 18 weeks forward. Generator and motor manufacturers believe, however, that the shortage of silicon and electrical sheet steel may force their plants to close before their supplies of copper products are exhausted.



ROCKET CAR: Duke Nalon, driver of the first rocket-assisted racing car, mounts the 40-pound rocket used in speed tests on the Indianapolis Speedway. The rocket, whose force lasts for two minutes, has increased the racer's initial speed by 20 mph. NEA photo

Bearing manufacturers have not felt the effect of the copper shortage directly because their requirements mainly are for copper alloy ingots which are in comparatively good supply. Inventories of the ingots are generally only 50 to 60 per cent normal. Purchases of other essential raw materials, such as lead, cadmium and zinc are difficult to make and are well below current requirements, forcing users to draw heavily on reserves. In the case of this industry also, the shortage of steel is the most critical problem that must be solved if plants are to remain open.

**CHICAGO** — Production of electrical manufacturing and related industries is hard hit by shortage of copper. This is holding back vitally needed motors, controls and communications equipment. Consumers are on hand-to-mouth basis. Chief bottleneck is wire, particularly in the finer sizes. Output of wire drawers is restricted by the lack of manpower to perform the numerous operations this highly finished product requires. Wire shortage has been aggravated further by the scarcity of copper for wrappings.

**NEW YORK** — Increase in copper price ceiling, first since August, 1941, may well release the key log which has jammed production in that metal for weeks from mine to fabricating plant. Intended to cover new wage agreements, negotiations are expected to start with remaining striking employees at mines and refineries.

Resumption of production will be halting in some branches of the industry and comes with a general shortage prevalent of copper and copper-base alloy products among consumers. With some users this shortage is as serious as that in steel and in numerous instances more so. Housing and consumer goods programs will feel impact in losses in production for months to come. Supplies of copper, lead and zinc are from 30 to 40 per cent short of demand and in addition to losses of output because of strikes.

The twaddling method in arriving at price ceiling revisions has been a hampering factor in disrupting transactions in metal that has been available. Severe shortages of practically all electrical supplies confront electrical utilities. Extended deliveries of fractional horsepower motors, about 70-80 weeks on current orders, are in part due to need of nonferrous components. About the only metals in plentiful supply are aluminum and magnesium. Copper wire and wire forms are especially tight while lack of lead is holding back assembly of transformers which in turn affects numerous industries. World demand for copper has increased sharply. Indications are Metal Reserve Co. may have to increase its buying price for both foreign copper and lead for third quarter shipment.

# More Dealers Licensed To Sell Surplus Tools and Equipment

WAR Assets Administration has licensed 1897 "approved dealers" to solicit and negotiate sales of government-owned surplus machine tools and other production equipment under the agency-dealer plan for such surplus property.

In addition, another 112 dealer appointments have been made by WAA regional offices but these had not been licensed as of April 30. The WAA regional offices also had on hand a total of 336 dealer-agency applications in process of screening and approval. Approved dealers are paid sales commissions equal to 12½ per cent of government disposal prices. Prices to buyers, however, are the same whether the purchase is made through an "approved dealer" or direct from any WAA field office.

ALABAMA

BIRMINGHAM: McVoy-Hansman Co., 2024 Sixth Ave. N.; Birmingham Charcoal & Glass Co., 822 N. Fifteenth St.; Charles W. Pooley Jr., 1120 First National Bldg.; American Saw Mill Machinery Co., 519 S. Twentieth St.; Industrial Machinery & Equipment Co., 2715 N. 24th St.; W. M. Smith & Co., 4601 First Ave.

MASSACHUSETTS

WORCESTER: Arter Grinding Machine Co., 15 Sagamore Road. FALL RIVER: Crescent Corp., 26 Front St. NEW HAVEN: Industries Outlet, 828 State St. WATERBURY: Clay-Klein Co. Inc., 76 Center St. BROOKLINE: DoAll Boston Co., 89 Washington St. WALTHAM: Charles W. Neff, 75 Bacon St. WILBRAHAM: Richard S. Brown, Burleigh Road: PITTSFIELD: Eagle Machine & Tool Co., 417½ Fourth St.; SPRINGFIELD: Springfield Salvage Co., 1562 Main St.; Van Norman Co., 3640 Main St.

NORTH CAROLINA

WINSTON-SALEM: R. G. Shouse Jr., 56 Burke St.

ILLINOIS

CHICAGO: Active Procurement Service, 5230 S. Keating Ave.; Metal Clean Solvent Corp., 1444 W. Randolph St.;Ternstrom & Swanson. 180 N. Wacker Drive; Metal Masters Co., 2346 W. Diversey Ave.; R. L. Finkenstaedt. 231 S LaSalle St.; Thomas Connelly Co., 2310 Indiana Ave.; E. W. Soesbe & Co., 565 W. Washington Blvd.

OHIO

CLEVELAND: Universal Welder Corp., 735 Carnegie Ave.; Chester J. Smitko, 13813 Beachwood Ave.; Adams Engineering Co., 1969 E 119th St.; Wyatt Sales Co., 314 Rockefeller Bldg.; Midwestern Sales, 1026 St. Clair Ave.; Factory Special Equipment. 3701 Bailey Ave.; George Fredric Arnold, 783 Union Commerce Bldg.; Gibbs-Conner & Co., 2861 Detroit Ave.; Elliott Electric Co., 2186 W. 25th St.; Midwest Buff Mfg. Co., 2515 E. 79th St.; Utilities Electrical Machinery Corp., National City Bank Bldg.; R. J. Bradley & Son, 488 E. 105 St.; Danber Distributing Co., 1137 Union Commerce Bldg.; William Ehret, 16512 W. Dale Ave.; Parma Stamping & Die Co., 1515 St. Clair Ave.

EAST CLEVELAND: A. R. Behl, 1237 E. 146th St.; UNIVERSITY HEIGHTS: Robert F. Hrebek, 2287 Lalemont Rd.; SHAKER HEIGHTS: Harry W. Rupple, 17821 Fernway Rd.; ROCKY RIVER: Jack D. Long, 19765 Battersea Blvd.; YOUNGSTOWN: Lombard Corp., 338 W. Federal St.; Ralph D. Lane, 302 Howe Savings & Loan Bldg.; AKRON: Buckeye Machine & Supply Co., 819 W. Howard St.; TOLEDO: Edmund Burke Co., 3930 Drexel; DAYTON: G-I Mill Supply Co., 467 Allwen Drive; HUDSON: John O. Morton, 37 Aurora St.; NORWALK: Kuhlman Machine Co.; STEUBENVILLE: Franklin A. Maniatis, 1217½ State St.

COLUMBUS: Hovekamp Supply & Equipment Co., 1086 Bryden Rd.; Henry P. Howe Co., 101 N. High St.; Beck Supply Co., 372 Dublin Ave.; Zahn Equipment & Supply Co., 165 N. High St.; E. W. Machinery Co., 521 N. High St.; CINCINNATI: D. M. Martin,1129 Liff Ave.

LOUISIANA

NEW ORLEANS: Southern Machine Tool & Supply Co., 524 Poydras St.

# Present, Past and Pending

### ■ NATIONALIZATION OF BRITISH STEEL INDUSTRY APPROVED

LONDON (by cable)—House of Commons last week voted 338 to 184 in favor of a government motion asking approval of plans to nationalize the British iron and steel industry. No legislation was involved. The ballot was in effect a vote of confidence for the government to go ahead with drafting a program to put the industry under state control.

### ■ APRIL SHIPMENTS OF CONSUMER GOODS INCREASE

WASHINGTON—Value of factory shipments of six major types of consumer durable goods was 28 per cent higher during April at $51,046,205 than in March at $39,869,804, according to the Bureau of the Census. Production increases ranged from 2 per cent for vacuum cleaners to 60 per cent for laundry equipment.

### ■ FIRM INCREASES OUTPUT OF AIR CONDITIONING UNITS

CLEVELAND—Pacific Mfg. Corp., this city, has begun mass production of a small air conditioning and cooling unit with the present schedule calling for 25,000 units annually.

### ■ JOY MFG. CO. BUYS BRECKENRIDGE MACHINE CO.

PITTSBURGH—Joy Mfg. Co., this city, has purchased the Breckenridge Machine Co., Cleveland. The latter company specializes in high-grade machining of parts, and also builds machine tools on order. H. W. Breckenridge and R. W. Breckenridge will assume the management of the plant and business for Joy, which for the present will operate as the Breckenridge Division of Joy Mfg. Co.

### ■ STEEL INDUSTRY GROUP MEETINGS SCHEDULED WITH CPA

WASHINGTON—Sheet and Strip Steel Industry Advisory Committee will meet with the Civilian Production Administration on June 4; Wire Products Industry Advisory Committee, on June 5.

### ■ BLISS PRESSES TO BE MADE IN SHEFFIELD, ENGLAND

DETROIT—E. W. Bliss (England) Ltd. has arranged with Thomas Firth & John Brown Ltd. for the manufacture in Sheffield, England, of large Bliss presses of welded steel construction. The Bliss company's own works in Derby, England, will concentrate on construction of medium and small size presses, canmaking machinery and dies.

### ■ OPA PERMITS ADJUSTABLE PRICING FOR PIG IRON

WASHINGTON—Effective May 29, pig iron can be sold on an adjustable pricing basis to protect producers against anticipated substantial retroactive increases in the cost of coal, coke and iron ore. Under the ruling, pig iron producers are permitted to sell at present ceiling prices but can collect on any increase that may be granted later by the Office of Price Administration.

### ■ FLOODS CLOSE SEVERAL EASTERN STEEL PLANTS

NEW YORK—Flood conditions resulted in total suspension of operations last week at the Central Iron & Steel Co. and Harrisburg Steel Corp. plants in Harrisburg, Pa., as well as at the Bethlehem Steel Co. properties at Steelton and Williamsport, Pa. Phoenix Bridge Co., Phoenixville, Pa., likewise was forced to suspend fabrication operations.

### ■ SEIBERLING BIDS FOR DALLAS, TEX., WAR PLANT

AKRON—Seiberling Rubber Co., this city, has submitted the lone bid ($1,248,000) for a ten-year lease of the government-owned war plant near Dallas, Tex., formerly operated by Continental Motors Corp. Seiberling would spend $3,250,000 above the lease cost in installing production equipment and remodeling.

### ■ ICC FREIGHT RATE ORDER UPHELD IN FEDERAL COURT

UTICA, N. Y.—A Federal Court here upheld last week an ICC order which would increase railroad freight rates 10 per cent in the North and East and would reduce them a like amount in the South. The court set a 60-day period for filing of appeals in the United States Supreme Court.

# Economic Welfare of Nation Seen Aided by Return of Competition

***Purchasing agents told at Chicago convention contest for business stimulates development of new and better products and brings prices down. Buyer sits in judgment on great variety of goods. Meeting is largest in association's history***

*CHICAGO*

"GREATEST single spur to the nation's economic welfare will not be some postwar science miracle, but an old, tried and true formula called competition, if we will keep it alive and promote it," Charles L. Sheldon, president, National Association of Purchasing Agents, said in keynoting the association's thirty-first annual international convention at the Stevens Hotel, Chicago, last week.

Despite the railroad uncertainty of the weekend preceding the convention, an attendance of close to 2500 was achieved, this figure being the largest in the history of the association.

In his address, Mr. Sheldon paid tribute to "the creative and developmental accomplishments of the scientists and engineers," and said that purchasing agents are witnessing almost daily new evidences of the scientific men's work in the form of new products and processes.

"The purchasing agent, constantly sitting in judgment upon a great variety of industrial products, is in a unique position to see and appreciate the results of competition, and knows its value in down-to-earth, dollar-and-cent terms," Mr. Sheldon said. "He sees how it stimulates the development of new and better products and brings prices down, and he knows that the American consumer benefits through better products at lower costs and a higher standard of living."

The speaker, who is manager of purchasing, Hood Rubber Co., Watertown, Mass., admitted that the problems and emergencies of the present period may make advisable some restraints that affect the free play of competition, but declared that in his opinion "the right solution of the economic and political problems affecting American industry will never be found without taking into full consideration the well-established and amply demonstrated power of healthy industrial competition."

"I question if there is a purchasing agent in America today who believes that the retention of controls will encourage production while holding prices down, or one who is not definitely of the opinion that, with the relaxation of control, prices will advance and production increase," R. C. Haberkern, vice president, R. J. Reynolds Tobacco Co., Winston-Salem, N. C., and past president of the association, declared.

Discussing "buying conditions we will face in the year ahead," Mr. Haberkern stressed the need for "swift, unrestricted mass production" and added that "production is possible only through a common sense, unselfish, realistic approach to the problem of reconversion. Let us be realistic," he said. "Prices are going to advance. But the majority of the American people are a sensible people and American industry, whose performance during and before the war period has established for them an enviable and unquestioned reputation, from the standpoint of production, efficiency and fair dealing, is not going to take temporary advantage of a situation which can only react to their undoing."

In a paper, "Commodity Prices and Inflation in the Year Ahead," A. W. Zelomek, president, International Statistical Bureau Inc., New York, pointed out that in planning his purchasing policies, the businessman must recognize that: (1.) Commodity prices will advance further, probably not reaching their peak until next year; but (2.) this rising cycle will be followed by a decline. Consequently, businessmen should: (1.) increase inventory turnover and reduce the length of commitments after the turn of the year; and (2.) reduce fluctuations in inventory valuations by using "last in first out;" and (3.) not overestimate postwar demand on the basis of current demand.

W. R. Herod, president, International General Electric Co., New York, told the convention that "the development of sustained purchases of the world's products offers a tremendous opportunity not only for reconstructon, but for a solid foundation for long-run economic development, which is the very basis of any sustained improvement in our standard of living."

### Lack of Dollars To Limit Exports

The speaker said he anticipates continued control of imports in the various countries, various economic controls regarding bulk purchases, difficulties in getting exchange, and in many cases considerable dislocation in markets. Predicting that there will be "at least a short period of tremendous opportunities for the highest levels of exports from America that have ever been realized in peacetime," he added that "availability of dollars will unquestionably be the first limitation to our exports."

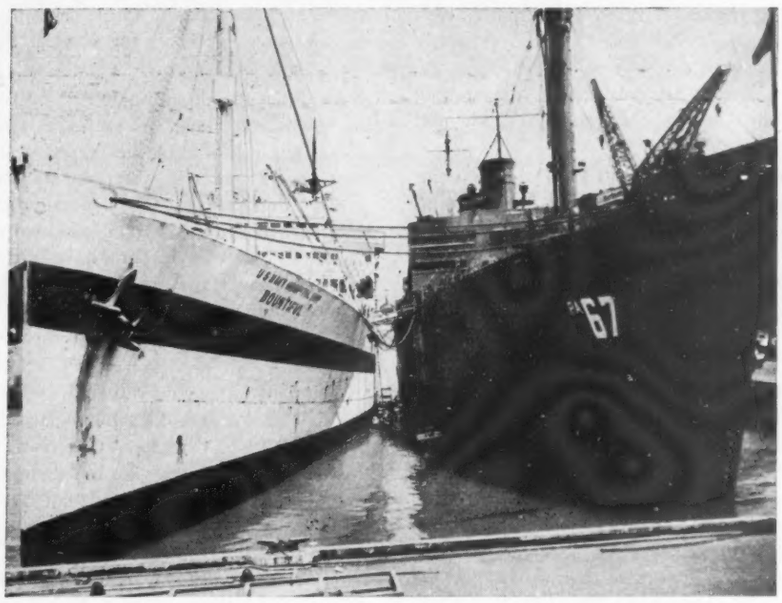
The steel shortage would rapidly become a myth if the steel industry were permitted to produce steel unhampered, Hiland G. Batcheller, president, Allegheny Ludlum Steel Corp., Brackenridge, Pa., told the convention. He said he was of the opinion order books today are watered with duplicate demand which will dry up fast once the steelmakers get the green light to go ahead on production. Until that time some form of share the steel, successful during the war, will be highly beneficial. If instead of jamming producers' books with orders consumers were to give schedules of materials needed to keep operating or to keep pace with other materials, the present distressing supply situation would be corrected to a large extent, he declared.

In a message to the convention, Price Administrator Paul A. Porter, Washington, pledged the administration once more to a policy of removing price controls as "rapidly as it is safe to do so," and pleaded for support of the administration's stabilization policy. Predicting that the resumption in production will be rapid once labor difficulties are solved, he said none should lose sight of the rapid strides made in the gigantic task of converting almost half of our economy from sword to plowshare, nor should we overlook the enormous network of

### NEW NAPA OFFICERS

**George W. Aljian, director, purchases and packaging, California & Hawaiian Sugar Refining Corp. Ltd., San Francisco, was elected president, National Association of Purchasing Agents.**

**New vice presidents are: Wayne Allen, County of Los Angeles; Ira C. Jared, Sun Oil Co., Dallas; E. G. Swanson, Herman Nelson Co., Moline, Ill.; Robert G. Mately, Whitman & Barnes, Detroit; Garnet T. Dickson, Goodyear Tire & Rubber Co., New Toronto, Canada; Ralph O. Keefer, Aluminum Seal Co., Pittsburgh; A. Grant Clark, McWilliams Dredging Co., New Orleans, La.; James A. Cooney, International Salt Co. Inc., Retsof, N. Y.; Charles M. Healy Jr., City of Springfield, Mass.**



MODERN ARK: The transport, U.S.S. BURLESON, right, which sailed June 1 for the Bikini Atoll, was loaded with animals to be used as substitutes for humans on the target ships in the atomic bomb tests. The ship's cargo included 200 goats, 200 pigs and 4000 rats. Tied up at Hunters Point Navy Yard, Calif., the BURLESON was adjacent to the Navy hospital ship BOUNTIFUL which will stand by near the test scene to give aid to possible casualties of the explosion. NEA photo

supply and distribution pipelines to be filled with goods that have been out of production and out of stock.

In another message, John W. Snyder, director, Office of War Mobilization, Washington, declared purchasing agents can contribute substantially to the fight against inflation by close buying, by maintaining minimum working inventories and by exercising the same ingenuity in simplification and substitutions which were displayed during the war. "The country still needs your unstinting cooperation," he emphasized.

Fighting the ever-increasing use of escalator clauses is resisting inflation, Clifton E. Mock, director of procurement, Treasury Department, Washington, asserted. "The proper function of democratic government is to preserve the conditions under which markets can operate fairly, freely and under genuinely competitive conditions. The restriction of inflation by discouraging use of escalator clauses is one method of preserving from self-destruction our traditional system of free enterprise."

Successful materials management today depends on a clear and complete understanding of the problems, an intelligent organization structure geared to the problem, and qualified personnel to insure a capable, smooth-working and co-operative group, stated R. L. Van Cleve, general purchasing agent, Carnegie-Illinois Steel Corp., Pittsburgh. "The problem in materials management is to place purchase orders with satisfactory sources of supply and sufficiently in advance of actual requirements to maintain a reasonable inventory status and yet meet the delivery situation as it relates to the items of interest and the operating needs."

Stating that while it is important not to tie up any more of the company funds in inventories than necessary to insure orderly plant operation, maintenance and repair, Mr. Van Cleve warned that the availability of a commodity also depends on the situation at the plant manufacturing the item, its business situation, labor conditions, etc.

Another important rule in materials management, the speaker said, is "that it is not good purchasing to have 'all your eggs in one basket' and that it may not be a healthy condition to have a definite continuing buyer-seller situation.

"One of our problems is the testing or trial of new products and materials, the development of a special material to meet a specific need, and in general, the importance of factual operating data. Since we are interested in making the most economical purchase, we are always looking for a better and higher standard. This attitude is not only good purchasing, but it promotes competition and stimulates development and progress."

Standardization and the development of specifications to cover many purchased items is another point that deserves attention, Mr. Van Cleve added. "The development of standard specifications is in the direction of making purchases on a sound basis, rather than purchase by trade names or other identifying symbols," he said.

Specifications should not be written around the product of any one manufacturer, if there is to be given equal opportunity to bid, the speaker warned. "An obligation of the purchasing department is to be fair at all times, and impartial to a fault."

"A specification should clearly state the scope of work to be informed," he further explained, "and in the case of equipment the functional capacity or the general over-all performance desired. Every bidder is entitled to have complete information, and all the terms and conditions before he bids."

A sound purchasing program and effective materials management can be carried out only if a sufficiently large and efficient organization is available, Mr. Van Cleve stressed.

### Adequate Organization Necessary

"The organization must be adequate to handle the volume of purchase orders to be placed. A minimum amount of supervision is desirable. Assignments of commodities to buyers should be specific and definite. Each buyer should be delegated authority commensurate with his responsibility and he should be entirely responsible for his commodities to the full extent of his capabilities.

"There is no question but that the subject of personnel is paramount in any organization. And every person in an organization should fully realize that 'A corporation may spread itself over the whole world—may employ 100,000 men, yet the average person will form his opinion of the corporation through his contact with one individual."

To show the magnitude of the purchasing and materials management job in modern industry, Mr. Van Cleve told his audience that the purchasing organization of Carnegie-Illinois includes 125 people and places about 275,000 orders per year.

A warning given by Robert C. Kelley, director of purchases, Dresser Industries Inc., Cleveland, was that sellers' markets end suddenly. "Sometime within the next few years, when productive facilities of this country are utilized to capacity, the present sellers' market will end," he said. "This change will occur before most of us are aware of it. Let us hope it does so in a more orderly manner than it did in the 20's. A sensible buying policy now will prevent a bust later."

# Kaiser-Frazer To Buy Into New Steel Company

***Agreement to purchase interest in new firm announced but details withheld. Kaiser shipping steel to Midwest***

PURCHASE of a substantial interest in a new steel company which will take over existing facilities of a "Midwest steel plant with a large productive capacity," has been agreed upon by the Kaiser-Frazer Corp., Willow Run, Mich., it was announced last week.

Details were not disclosed, not even the name of the steel company, but speculation centered on the possibility that Kaiser-Frazer may be participating in a proposed new group of small steel companies operating a number of sheet mills, and which was reported some time ago negotiating for the purchase of a steelworks in the Youngstown-Sharon area.

Along with this announcement, Henry J. Kaiser announced that steel ingots from the Fontana, Calif., plant of the Kaiser Co. Inc., are being shipped to Midwest steel centers for processing into sheet and strip for both Kaiser-Frazer and Graham-Paige Motors. The arrangement is said to have been made without depriving Pacific Coast steel users of any of the normal Fontana capacity by producing extra ingots beyond Fontana's finishing capacity.

At the same time it was announced "production in volume this summer" of a new Kaiser special passenger car is planned by Kaiser-Frazer. The model is a conventionally engineered rear wheel drive car, reported now on assembly lines, leading some observers to speculate that what has been done is to adapt the Kaiser body to the Frazer chassis.

## Colorado Fuel & Iron To Make New Geneva Steel Bid

New bid is to be submitted for the government-owned Geneva steelworks at Geneva, Utah, by the Colorado Fuel & Iron Corp., Denver, Rep. J. E. Edgar Chenoweth (R., Colo.) informed the House of Representatives last week as he demanded that sale of the plant to the United States Steel Corp. be set aside.

Attacking the sale as fostering moncpoly, Representative Chenoweth urged the Department of Justice to rule against the U. S. Steel bid, although conceding U. S. Steel made the most attractive cash offer. He stated the Colorado company will submit a new bid and he urged the War Assets Administration hold up sale of the Geneva plant until this bid can be considered.

Chenoweth charged the Colorado company had asked WAA to hold up bid opening until it could submit a new offer, but this request was ignored.

Rep. John R. Murdock (D., Utah) defended sale of the plant to U. S. Steel, stating such had the approval of the western states.

Report of the Surplus Property Subcommittee of the Senate Committee on Military Affairs recommended acceptance of the U. S. Steel bid subject to various conditions, including approval of the Department of Justice, other requirements deemed necessary by the Legal Division, it being maintained that the bid meets the many applicable objectives of the Surplus Property Act, provides many advantages to the government and the national economy, meets the test of adequacy of fair value for the plant, and that it is more favorable than any other bids submitted.

Detailing the various advantages of the U. S. Steel bid the subcommittee said it will assure the most effective use of the Geneva works for war purposes and common defense, and that U. S. Steel proposes to preserve for future emergencies the original facilities of the Geneva plant in good state of repair for not less than five years.

Also, that it will stimulate full employment of war veterans, will facilitate transition of the works from wartime to peacetime production, will foster postwar employment opportunities, will promote production and utilization of productive capacity and natural resources, will foster development in the West of new independent enterprise and will obtain for the government as nearly as possible a fair value.

Other advantages of the bid included the fact that it provides immediate disposal, final and complete, to private industry; offers highest possible assurance of continued operation; ends all future financial responsibility of the government; obligates U. S. Steel to spend $18,600,000 for additional facilities and $25 million for other expansion including a cold-reduction mill; provides assurance that the plant will be handled by qualified operators; provides that for all products produced at Geneva and sold on the basing point method, a basing point will be established at Geneva.

Adequacy of the U. S. Steel bid, the report states, is measured not solely by the cash consideration of $40 million for the plant but by the summation of all considerations in the bid.

**BUILDING ENGINE BANK:** These newly designed 6-cylinder engines for the 1947 Frazer are arriving and being stockpiled at Willow Run to insure continuous manufacture. The engines, especially developed by Continental Motors and Graham-Paige engineers, develop 100 horsepower with maximum economy

# Maximum Gear Prices Increased 13 Per Cent Above Base Prices

***Action by Office of Price Administration, effective May 27, covers gears, pinions, sprockets and speed reducers but does not cover any item designed for use in motor vehicles. Special treatment accorded to certain motor manufacturers***

MAXIMUM prices of gears were increased 13 per cent last week by the Office of Price Administration, effective as of May 27. The price action covers gears, pinions, sprockets and speed reducers, including variable speed drives, automotive or tractor transmissions, transfer cases, power take-offs, differential or axle assemblies and not including any item designed primarily for use in private or commercial motor vehicles.

Special treatment has been accorded manufacturers who produce or supply motors to which they have added gears. Manufacturers had been granted, effective May 13, price increases of 16½ per cent in the case of integral horsepower electric motors and 27 per cent in the case of fractional horsepower motors. In order to give effect to the separate increases authorized for motors and for gears, the order issued last week (No. 637 under revised maximum price regulation 136) sets forth in tabulated form the net unit increase applicable to any particular gear motor manufactured and sold as a unit. The manufacturer may utilize, however, the 13 per cent increase factor without notice to OPA.

To determine the appropriate percentage increase factor, the motor manufacturer first ascertains the percentage the sales price of a standard motor of the same rating and capacity as the particular motor manufactured bears to the total sales price of the gear motor; this percentage fixes the appropriate line in column 1 in the table; on the line thus fixed, the manufacturer will find in column 2 the appropriate percentage increase factor to be applied to base prices in the case of fractional horsepower gear motors; and in column 3, the appropriate percentage increase factor to be applied to base prices in the case of integral gear motors.

| Col. 1 | Col. 2 Gear Motors Fractional hp | Col. 3 Gear Motors Integral |
|---|---|---|
| 0%-19.9% | 13% | 13 % |
| 20%-39.9% | 17% | 14 % |
| 40%-59.9% | 21% | 15 % |
| 60%-79.9% | 24% | 16 % |
| 80%- 100% | 27% | 16.5% |

The upward revision in gear prices was made following completion of a survey by OPA which revealed that a price increase of 13 per cent was required to return to the industry a profit of 10.7 per cent on its net worth which was realized during the base period years of 1936-39. The survey showed that the total average weighted materials increase in the industry since Jan. 1, 1946, amounts to 9.8 per cent. Steel forgings and castings constitute about 45 per cent of the materials requirements of the industry and brass and bronze castings constitute about 20 per cent.

The information presented to OPA showed that approved wage increases have been granted by manufacturers, representing considerably more than three-fourths of the total industry sales volume, averaging 13 per cent since Jan. 1, 1946. This entails an increase in sales prices amounting to 5.2 per cent.

## New Standards Issued for Steel Rivets and Band Saws

Simplified practice recommendations for steel rivets and for metal cutting band saws have been issued by the National Bureau of Standards, Washington. The former, identified as R221-46 and effective from June 1, establishes a voluntary simplified list of recommended standard stock production sizes for small rivets having round head, flat head, truss or wagon box head, and countersunk head, also belt rivets, tinners' and coopers' rivets, and large rivets with button head.

Copies of the recommendation covering metal cutting band saws, identified as R214-45, are now available. It establishes a simplified list of types and sizes of hard edge, flexible back, metal cutting band saws for regular stock purposes. Width, thickness and number of teeth per inch are given for two types of saws, and general provisions are included covering type of tooth set, shape of teeth, hardness of saw, and tolerances.

## Electrical Engineers To Meet in Detroit, June 24-28

Subjects listed for the technical program of the summer convention of the American Institute of Electrical Engineers, to be held at Hotel Statler, Detroit, June 24-28, include: Electric welding, safety, power transmission and distribution, automatic stations, servo mechanisms, instruments and measurements, electronic tubes and applications, industrial control, transportation, power generation, communication, and others. Concurrent inspection trips have been arranged to Chrysler engineering laboratories, Edison Institute museum, Ford Rouge plant, International Detrola Corp. and U. S. Rubber Co.

# GOVERNMENT CONTROL DIGEST

***Weekly summaries of orders and regulations issued by reconversion agencies. Symbols refer to designations of the orders and official releases. Official texts may be obtained from the respective agencies***

### OFFICE OF PRICE ADMINISTRATION

**Culverts:** Manufacturers' ceiling prices for corrugated metal culverts have been increased 7 per cent, effective May 24, over March, 1942, prices. (GMPR; OPA-T-4556)

**Tools, Dies, Jigs, Patterns:** Pricing system provided for specified sales by manufacturers of tools, dies, jigs, fixtures, molds and patterns on Apr. 26 has been extended for use by them when these industrial equipment items are made and used specifically with any product and sold to the buyer of that product. (MPR-136; OPA-T-4553)

**Electrical Machinery:** Price control on additional electrical machinery and equipment items was suspended May 24. Items covered by the suspension action include the following: Coils, specifically designed and made for motors, generators, transformers or related equipment; distribution cutouts not including building equipment and supply items; specified high voltage insulators; pole line hardware and line construction specialties; power switching equipment, except that of 601 volts or lower; repair and replacement parts designed for use in equipment suspended from control. (SO-129; OPA-T-4555)

**Electric Temperature Controls:** Maximum prices of automatic electric temperature controls for heating, air conditioning and refrigeration increased 20.8 per cent over Oct. 1, 1941, prices. This action, effective May 24, supersedes a 5 per cent increase granted last October when the industry qualified as a reconverting industry. The action does not cover industrial process controls. (MPR-591; OPA-T-4554)

### CIVILIAN PRODUCTION ADMINISTRATION

**Plumbing Fixtures:** Manufacturers of residential-design models of bathtubs, lavatories, laundry trays, sinks, sink-and-tray combinations, shower stalls, receptors, stall-and-receptor combinations, and water closet bowls and tanks can now obtain "CC" preference ratings with which to secure capital equipment and maintenance, repair and operating supplies. The ratings will not apply to trim nor to materials for making trim, including such items as metal faucets, ballcocks, flush valves, traps and exposed nickel plated and chrome supply pipes and the like. (PR-28; CPA-LD-92)

# Patent Office Reforms Expected To Speed Up Patent Procedure

***Change of most immediate importance is adoption of a printed standard application form with oath, power of attorney and petition all on one page, and requiring only one signature by inventor. Rule book on patent practice also being revised***

UNDER DYNAMIC Commissioner Casper W. Ooms, the Patent Office is instituting some major reforms which should hasten patent procedure materially in the future.

The one of most immediate importance is the adoption of a printed standard application form with the oath, power of attorney and petition all on one page—and requiring only one signature by the inventor.

Previously it had been necessary for the inventor to sign at least four times—the petition, the specification and claim form, the oath and the power of attorney. In the past these forms have been typewritten, adding unnecessarily to the stenographic burden in the offices of hundreds of patent attorneys all over the United States. In the Patent Office it has taken the full-time labor of three specialists to go over these typed forms and make certain that they fulfilled the requirements of the statute.

Every day at least two or three applications came in to the Patent Office minus some of the necessary signatures. The system created difficulties for patent attorneys who encountered delays in getting all the necessary signatures, particularly when dealing with inventors through the mail.

This reform has been talked about for many years. In 1929 a patent attorney actually entered suit in an effort to force the Patent Office to simplify the procedure. The Patent Office at that time resented this attempt at forcing simplification; it fought the suit and won the case.

Being printed, copies of the new application form do not require any check, except to make sure that the blank spaces have been filled in, that the inventor has signed in the proper place, and that the signature has been properly witnessed. The welcome tendered the new form is reflected by the fact that patent attorneys already have requested approximately 15,000 copies. These are furnished free of charge to encourage their use.

Another major reform is complete revision of the Patent Office's 102-page rule book covering patent practice. Some of the rules in this book are more than 100 years old. Some of the forms, set forth as guides to patent attorneys in preparing applications, have been unchanged since 1880. Among archaic contents is a page of drawings of the parts of a sausage grinder invented some 70 years ago, along with a printed description of the parts shown in the drawing. So verbose and complicated is the language that the Patent Office today would be apt to disqualify any application couched in similar terms.

Mr. Ooms has a staff of 20 people working on the revision of the rule book, and he insists that the job must be completed by the end of 1946.

"We will cut the size of the book approximately by half," Mr. Ooms told STEEL. "We will eliminate the technicalities. We will make it possible to get a patent at a lower cost than has been necessary in the past. We will hasten the process of obtaining a patent. It now takes three years on the average to get a patent. We expect that revision of the rule book alone will cut this time by 10 to 20 per cent.

"Additional time will be saved when attorneys get out of the habit of using legalistic, involved descriptions of the kind the Patent Office has encouraged in the past. These often have employed obscure wording. We now are encouraging the use of plain, simple language, and further savings of time will result from this reform. As an example of the sort of thing we want to get away from, the thirty-second claim of the patent on an improvement on a torque wrench starts off as follows:

" '32. A torque wrench comprising: A handle member including a body having a chamber extending throughout substantially the full length thereof, and a grip portion extending longitudinally from said body; indicator means carried by said handle member adjacent to one end of said chamber; a pre-assembled unit including a head member and an elongated substantially cylindrical rod means, said pre-assembled unit being adapted to be inserted bodily in said chamber, said head. . . .' and so on, in a single sentence of more than 250 words, whereas all the inventor was really claiming was a special swivelled mounting of a spring in the torque wrench.

CASPER W. OOMS

### Evasiveness Discouraged

"An example of evasiveness and verbosity which we would like to discourage is in a patent granted in 1900 to a man who invented a removable bottom for a washing machine. The device was not complicated, and could have been simply stated, but here is how the patent began:

" 'My invention, which will be hereinafter fully described and claimed and illustrated in the accompanying drawings, made a part of this application, relates to certain new and useful improvements in washing-machines, and more particularly to that classification thereof wherein provision is made for combining the boiling and washing process, the object being to simplify the process as much as possible and to reduce the cost to a minimum.' "

Recent court decisions, Mr. Ooms points out, hold that a patent, stated in a broad definition, is amply protected by what is known as the "doctrine of equivalents." Because of this trend in the courts, and with the simplification of practice to result from the current revision of the Patent Office rule book, Mr. Ooms feels that it is only a matter of time before patent attorneys become reconciled to a simple, broad statement of the patent claim.

Furthermore, steps now are under way to build up a larger staff of trained specialists in the Patent Office. At present the Patent Office continues to lose ground, a situation which is not helped any by the fact applications now are being received at the rate of 100,000 a year, which

is the biggest volume in the history of the office. Mr. Ooms estimates that at the beginning of 1947 the Patent Office will be approximately two years behind schedule; at that time it will have a backlog of some 150,000 unprocessed applications which will be over and above those received currently every day. But Mr. Ooms believes that that will mark the peak of the backlog, and that from that time forward the simplified procedure and the larger staff will permit it to be reduced at a fairly rapid rate.

## Industries Provide Special Training for Navy Officers

Under a plan arranged through the Navy Industrial Association, Navy officers are to receive intensive training in their specialties within industry. They will receive four to six months' training by being assigned to duty in businesses associated with their Navy work. As the initial step under the plan, 19 Supply Corps officers began their training May 15.

Companies, and their officials, participating in the program include:

J. Frederic Wiese, vice president, Lukens Steel Co.; William McL. Pomeroy, general traffic manager, Pennsylvania Railroad; James H. Pipkin, assistant to president, the Texas Co.; T. C. Davis, assistant treasurer, E. I. du Pont de Nemours & Co.; C. M. Bloodgood, assistant to vice president, Air Reduction Co.; H. L. Erlicher, vice president, General Electric Co.; J. R. MacDonald, General Cable Corp.; T. D. Cartledge, vice president, Union Carbide & Carbon Co.; J. J. Evans Jr., Armstrong Cork Co.; Bruce Wallace, comptroller, Otis Elevator Co.; Norman O. Aeby, general purchasing agent, Johns-Manville Sales Corp.; and S. W. Murkland, comptroller, and D. F. G. Eliot, Western Electric Corp. Also in the program is International Harvester Co.

Under the plan, the Navy officers will return to their regular Navy duties at the close of the training periods, with an intimate knowledge of the business methods, range of products, manufacturing and other problems of typical companies with which the Navy has dealings. Other plants, it is expected, will be enrolled in this industrial training program in the near future.

## Inventory of Surplus Automotive Parts Completed

Inventory of all surplus automotive parts has been completed by the War Assets Administration. The inventory disclosed that parts valued at about $174 million are available through the Detroit regional office.

# AAF Makes Only Fair Progress in Setting Aside Tools for Emergency

***Army Air Forces wants 40,000 machine tools and equipment suitable for use in airframe and aircraft engine plants put into equipment reserve but thus far only 5000 have been located and earmarked for storage***

ONLY FAIR progress has been made so far by the Army Air Forces in building up a reserve of machine tools and other production equipment for use in another national emergency.

Last year the AAF compiled a list of some 37,000 tools it wanted to set aside, all general-purpose tools for use in airframe and aircraft engine plants. Later this list was increased to about 40,000 to include forging machinery and some other equipment for use in plants of subcontractors.

So far about 5000 of these tools have been located and earmarked for storage; of these, 1065 were located in April alone. At present the remaining 35,000 tools are being sought in various Army-owned establishments. Later on, it is expected, the search will be extended to equipment owned by the Reconstruction Finance Corp., but that will not happen until after Congress has approved a pending bill which would permit title to be passed from one government agency to another.

How long it will take to carry out the AAF program, and whether the program ever will be carried to completion are questions that are still to be answered. The Bureau of the Budget has not yet given its approval to a request for $15 million to handle, ship and prepare 40,000 tools for storage; at AAF estimates the cost will range from $350 to $400 per tool on the average. Another factor that slows down the program is the War Department policy of giving right-of-way to reconversion needs when disposing of surplus equipment. The AAF has lost a good many earmarked tools because of this policy.

Last year the War Department set up a tentative policy favoring disposition of airframe and aircraft engine plants to companies that would maintain them intact for such production work. This policy since has been abandoned on the ground that it might invite discrimination in the disposition of government-owned plants.

The Navy Bureau of Aeronautics also last year set up a list of some 26,000 general-purpose machine tools and other types of production equipment for use in making airframes and airplane engines in case of another national emergency. But its progress in locating and earmarking these tools for storage has been negligible. That is because title to most equipment installed for Navy work during the war is held by the RFC. Execution of the Navy program, therefore, will have to be held over until such time as Congress enacts the needed legislation.

In addition to the plans of the Army and Navy to build up reserves of equipment to produce airframes and airplane engines, other branches of both services have plans to build up reserves of equipment for other war production. The Army Ordnance Department (STEEL of Feb. 18, p. 70) has a list of some 10,000 tools to be stored.

Having a bearing on these storage programs is a new study undertaken by the Army and Navy Munitions Board. It will survey underground sites throughout the nation "which might be utilized for long-term storage of machine tools and war production equipment and which, if necessary, may be adaptable in wartime for vital industrial production and other military purposes."

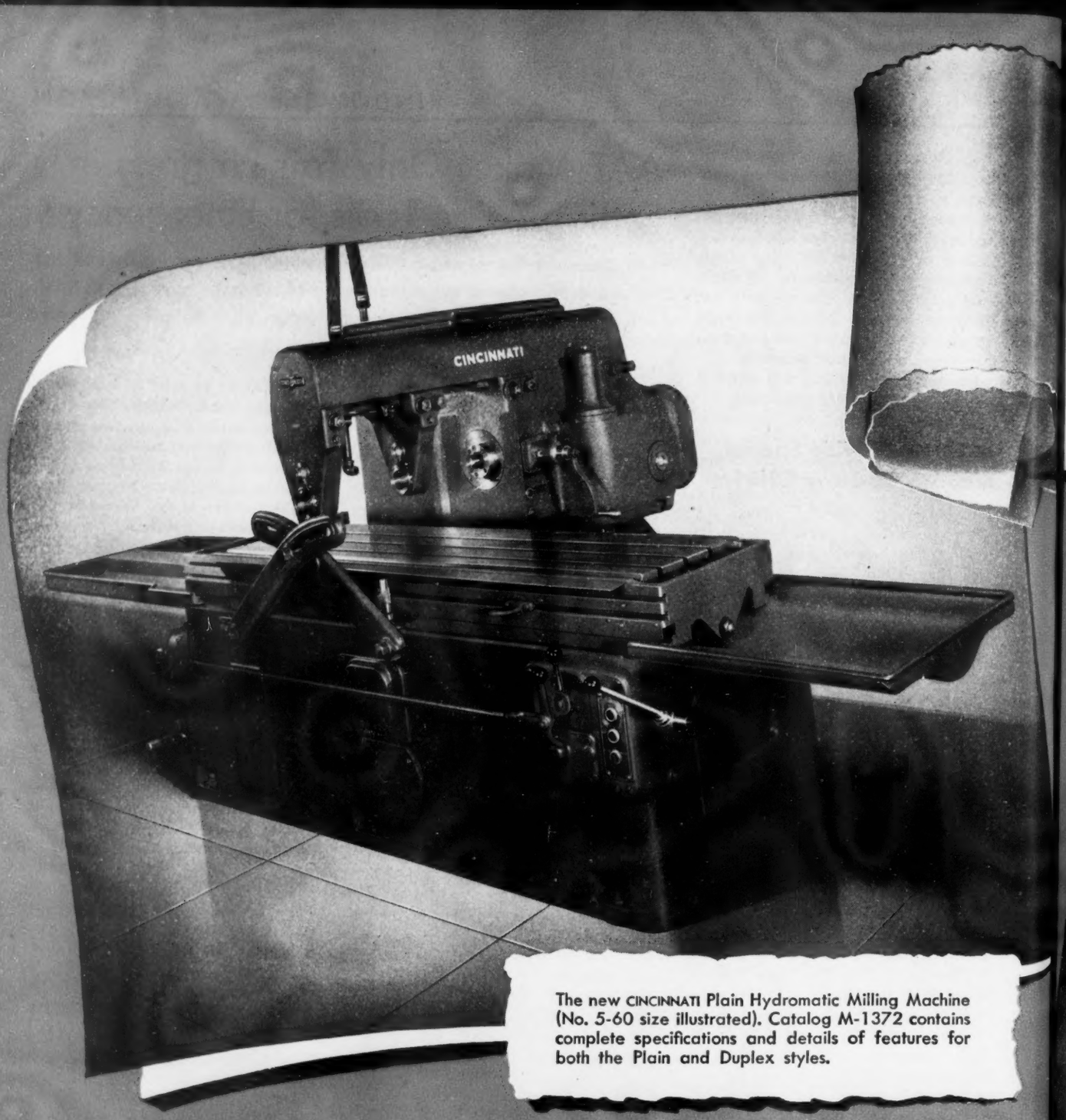
## Licenses Required To Export Aluminum "Prefab" Houses

Effective May 27, aluminum prefabricated houses in which aluminum is the chief value have been added to the Positive List of Commodities requiring individual licenses for export, according to announcement by the Office of International Trade.

Effective immediately, kerosene, including "burning oils, mineral colza, petrolite, and signal oil," have been removed from the Positive List and placed on general license for exportation to Group K countries.

Under another recent ruling, the OIT now is ready to grant licenses for the export of commodities manufactured or processed in Germany or Japan, or by any person or company on the wartime proclaimed list of blocked nationals.

Use of the revised Application for Export License and Priority Assistance, Form IT 419, is now mandatory, and original applications submitted on Form FEA 419 are being returned without action.




The new CINCINNATI Plain Hydromatic Milling Machine (No. 5-60 size illustrated). Catalog M-1372 contains complete specifications and details of features for both the Plain and Duplex styles.

● You can expect big things from the new CINCINNATI Hydromatics. They're heavier, and much more powerful. They incorporate all the time-proved Hydromatic features, plus many new and exclusive advantages which make them especially useful for heavy cuts and rapid metal removal on all types of metals, and using all types of cutters including sintered carbide. The new CINCINNATI Hydromatics are built in twelve sizes, in Plain and Duplex styles, ranging from 24" to 90" table travels, powered by 7½ to 30 h. p. motors (higher if desired), depending upon the size of the machine. Catalog No. M-1372 contains complete specifications and other important details. A copy of this informative book is yours for the asking.

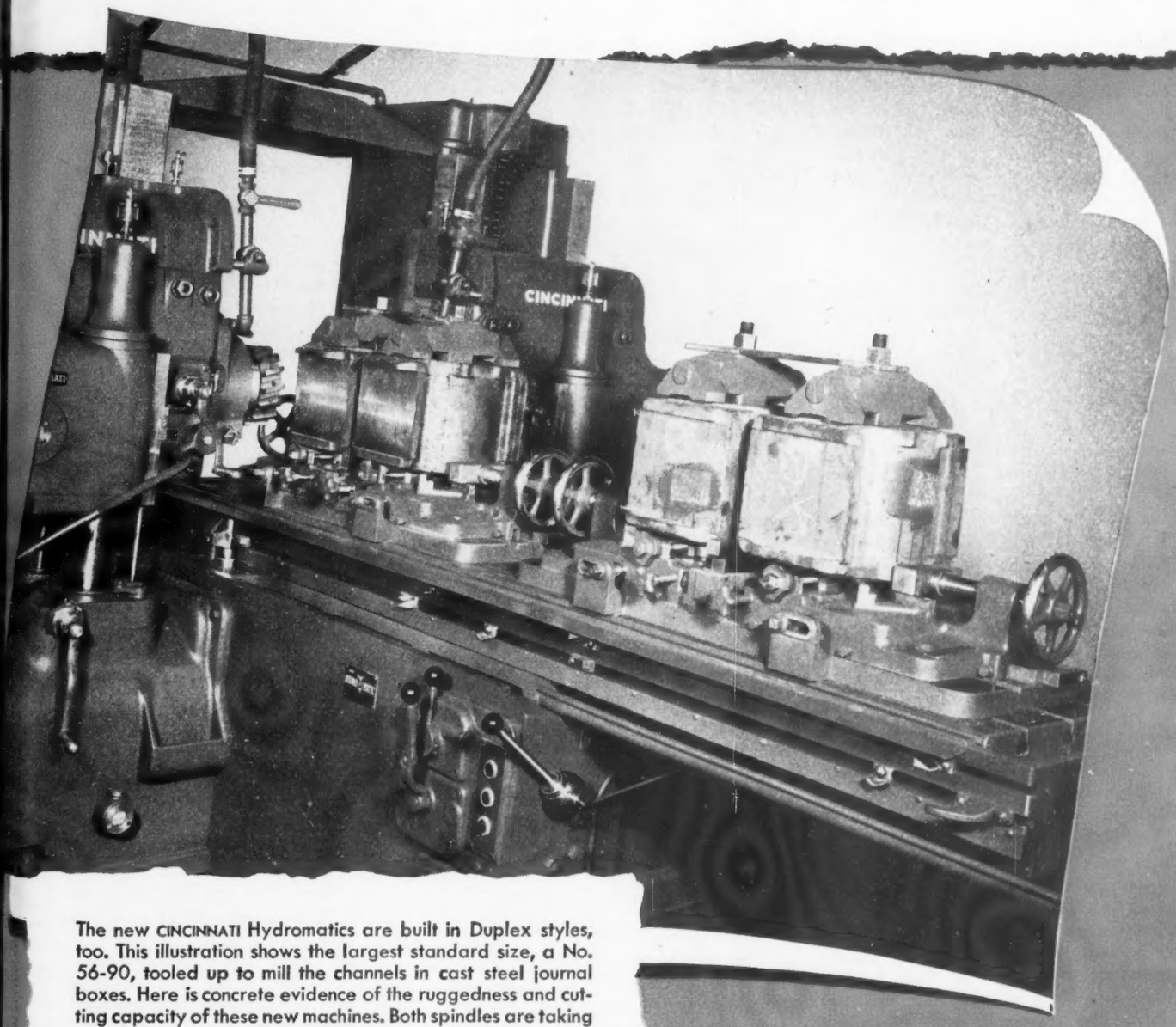
CINCINNATI

# THE CINCINNATI MIL

MILLING MACHI

# *Introducing*

## THE NEW CINCINNATI HYDROMATIC MILLING MACHINES



The new CINCINNATI Hydromatics are built in Duplex styles, too. This illustration shows the largest standard size, a No. 56-90, tooled up to mill the channels in cast steel journal boxes. Here is concrete evidence of the ruggedness and cutting capacity of these new machines. Both spindles are taking a cut 3/8" deep by 11" wide (the full diameter of the cutters).

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

# Newcomer in Senate Debunks Idea That Right To Strike Is Sacred

***Senator Stanfill's commentary reflects thinking of an increasing number of legislators who believe that labor laws need thorough overhauling. Strikes, he says, tend to violate constitutional rights of all citizens***

IT MAY BE because he is a newcomer to Congress—he was appointed to the Senate last November—that Sen. William A. Stanfill (Rep., Ky.) delivered the outstanding commentary on our current labor situation during the Senate debate on the so-called Case antistrike bill. He examined it from stem to stern, and pointed out why our economy is subject to continual disruption by strikes and work stoppages.

His speech was of particular importance because it reflected the thinking of an increasing number of legislators in both houses who recently have come to believe that our labor laws need a thorough overhauling.

Senator Stanfill's speech brought out into the open a question which behind the scenes recently has received a great deal of discussion by senators and representatives, and which is the most important question underlying the problem of proper labor legislation. That is: Is the right to strike really as sacred as labor leaders claim? He declared definitely that strikes are an outmoded concept and that labor disputes should be settled by peaceful and orderly procedures just like ordinary civil cases. The right to strike, he pointed out, is not a constitutional right; on the contrary, strikes tend to violate the constitutional rights of all our citizens.

### Says Labor Has Come of Age

The burden of his speech was that labor has come of age and no longer "needs the nursing care which attended its development." Under the National Labor Relations Act of 1935 and the Fair Labor Standards Act of 1938, "labor has grown from a group of 3,500,000 people in 1933 to about 13 million at this time. If each one of them has the average number of dependents, organized labor now represents some 40 million people, and constitutes by far the largest single group in our population.

"Its power, both economic and political, has grown with its membership, so that today it occupies a position which is substantially equal to that of business. In many cases it occupies the status of an absolute monopoly. This fact seems to have escaped the notice of many liberals who still cling to the pattern of thought of a decade ago.

"What we now have are big unions and big business. The conflicts between the two result in a disregard of the general welfare and a disruption of our economy. This is always bad, but it is particularly damaging in the present period of reconversion because it slows up the production of goods, which is the only sure bulwark against inflationary tendencies which presently beset the American economic structure.

"This condition, if allowed to proceed, will bode ill for labor and the country as a whole.

"The question is simply whether John L. Lewis or any other man should have the power arbitrarily to deprive the American people of something that is essential to their existence. This does not call for spot or hot-headed legislation aimed at Mr. Lewis. It does call, however, for legislation which will balance power with responsibility, and which will reaffirm and re-establish the principle that the promotion of the national welfare is the primary concern of Congress."

### Three Steps To Protect the People

Senator Stanfill, a lawyer from Hazard, Ky., listed three steps to be taken by the Congress to protect the people:

"First. The Wagner Act must be made over into an instrument that will protect the employer as well as the worker.

"Second. All union immunity from the laws that govern the conduct of the rest of us must be withdrawn.

"Third. A law must be enacted to make it illegal for any labor leader to levy his own private tax upon production."

Labor unions, Senator Stanfill went on, have made great contributions to the American people's welfare—"to the welfare of all the people. But we now have some labor leaders who are as powerful in their own field as the big barons of business ever were. Among these are Petrillo, Murray, Lewis, Green, Reuther and others. Not all these leaders abuse their power. But some of them do, and all of them can, because the laws are insufficient to restrain them. We must bring the labor leaders under public control as business leaders have been brought under public control, and we must begin this work in earnest. A halt must be brought to a movement that is tantamount to revolution."

Senator Stanfill dwelt at some length on the heretofore almost universal belief that the right to strike is sacred.

"There is a militancy in the tone and attitude which labor displays upon this subject which shows how deeply ingrained into the fibers of the labor movement is this idea," he said. "Nevertheless, I think it merits examination. A strike does not involve a simple quitting of the job because of dissatisfaction with conditions, plus a determination not to resume work until conditions are changed. In a strike, a workman does not release his claim to the job. In fact, under the Wagner Act, he remains a legal employee of the employer against whom he is striking. Since he retains his employee rights, the employer cannot assure anyone who may take his place while he is on strike of continuation of employment in the same capacity when the striker returns to work, because that might constitute an unfair labor practice. Strikers are able, by mass picketing, to prevent anyone from going into the struck premises for the purpose of working while the strike is in progress.

### Believes Striking Is Not a Right

"In other words, under the law, a strike includes several elements which certainly are not in the minds of our people and were not there when the thirteenth amendment was adopted. The right to strike involves concepts which go far beyond those included in the prohibition against involuntary servitude. The right to strike is not a constitutional right, although it has been clothed with certain privileges and immunities by statute, and it is certainly not illogical to place certain safeguards around the exercise of that right."

"I am convinced," he declared, "that peaceful and orderly settlement of industrial disputes is just as much a necessity as is the peaceful and orderly settlement of civil wrongs. Industrial warfare is an outmoded concept and should be avoided by the substitution of an appropriate code of procedure."

Senator Stanfill urged congressional action particularly because "it is now clear that the executive branch of the government will not rescue us from a crisis of its own making. . . . The unorganized lobbyless popular majority must be surprised as well as angry at the spectacle of a government confessing and even asserting its impotence to abolish a situation brought about by previous governmental acts."

It is not because the present government hesitates to assert power, he went

NEWEST ADDITION: Inland Steel Co.'s newly acquired diesel-powered ship, THE INLAND, recently made its first trip under the Inland flag carrying steel sheets for Detroit's automobile factories. Two hundred and fifty feet long and equipped with two deck cranes, the ship was used during the war by the War Shipping Administration for ocean travel. It is the newest addition to Inland's fleet

on. "The size and power of the federal government has grown to vast proportions, and the people have become accustomed to the idea that it can do everything." But this sweeping paternalism, he continued, has been expressed "in favoritism for groups with organized voting strength."

Summing up his corrective suggestions, Senator Stanfill singled out as most important the one "which requires both sides to live up to their contract. If unions can break agreements with relative impunity, then such agreements do not tend to stabilize industrial relations. The execution of an agreement does not by itself promote industrial peace. The main purpose of an employer in signing a collective labor agreement is to assure uninterrupted operation during the term of the agreement.

"Without some effective method of assuring freedom from economic warfare for the term of the agreement, there is little reason why an employer should desire to enter into any agreement."

## $2 Million Sale of Surplus Machinery To Start June 10

Surplus government-owned machine tools, industrial equipment and office furniture and equipment, with an approximate value of $2 million, will be offered for sale June 10 to July 12 at the plant formerly operated by the Curtiss-Wright Corp. at Beaver, Pa. Purchasers who have priority rights of purchase will be served through June 26 while commercial buyers will be able to purchase from June 27 through July 12.

## Britain's Merchant Shipping Drops to 19,600,000 Tons

Britain has emerged from the war with a merchant tonnage of 19,600,000 tons compared with its prewar merchant shipping of 23,300,000 tons, according to a report on the future of the British merchant fleet by American sources in London.

## Clearing of Termination Inventory About Completed

Clearing war production plants of termination inventory has been virtually completed, according to the War Department. Since the end of the war, property having an original cost of $2124 million has been purchased by the contractors in whose plants the property was located. An additional $893 million has been shipped to the warehouses of the various disposal agencies. Another $646 million has been disposed of or utilized by the Army.

# AAF Establishes Air Institute at Wright Field

*New school to provide technical training in engineering and logistics. First class to start this fall*

ESTABLISHMENT of the Air Institute of Technology at Air Materiel Command headquarters, Wright Field, O., has been announced by Lt. Gen. Nathan F. Twining, AMC commanding general. The purpose of the school is to furnish the Army Air Forces with a nucleus of officers highly trained in engineering and logistics and will graduate from 200 to 300 officers yearly. Its first classes will begin Sept. 3, 1946.

Offering Bachelor of Science and Bachelor of Business Management degrees, the school, when accredited by the Society for the Promotion of Engineering Education, will consist of a two-year course. Advanced courses will lead to a Master of Science degree in as little time as one year. Special courses are also being planned in such fields as nuclear physics and electronics.

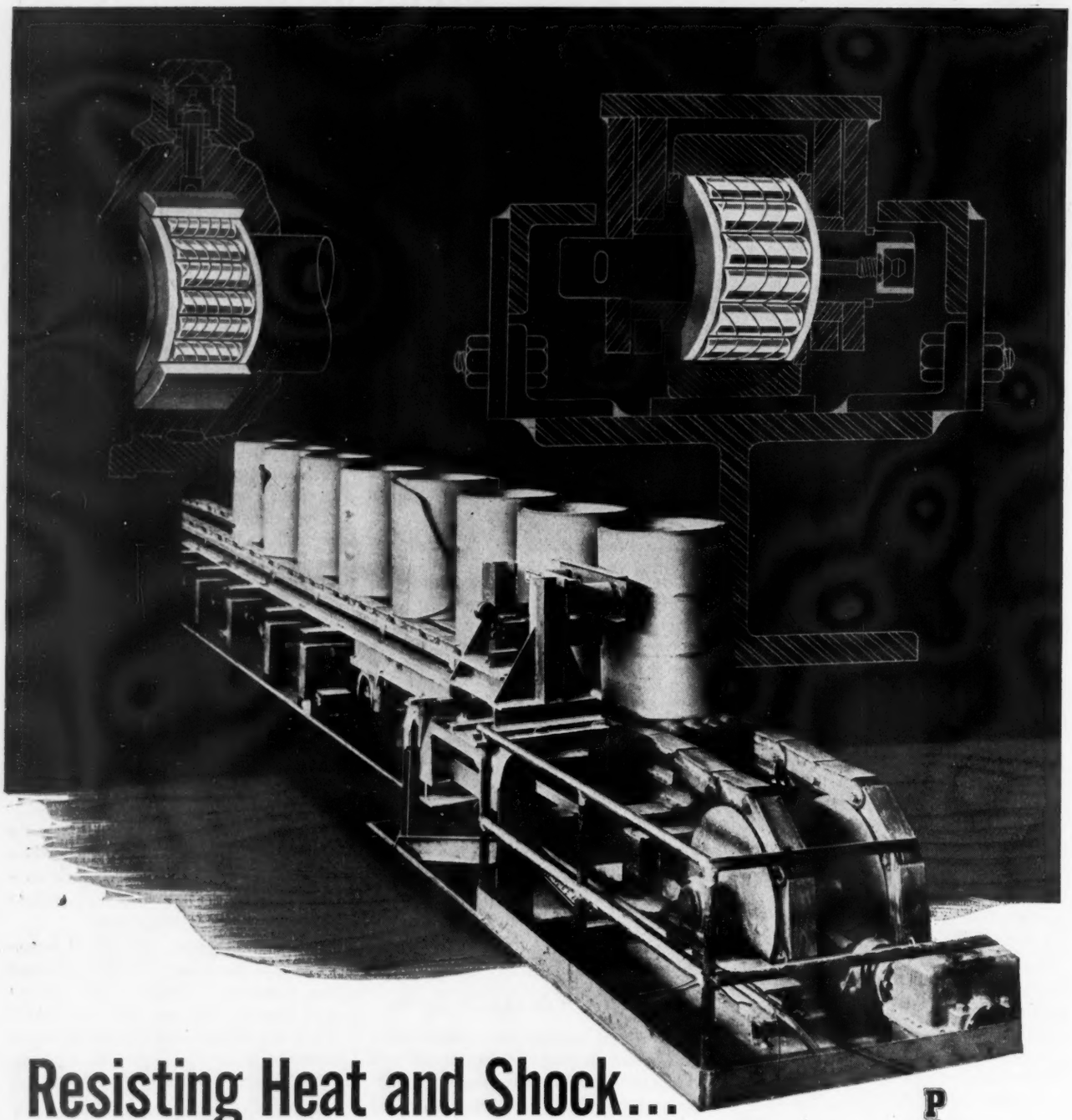
Initiated by the secretary of war, the school is located at Wright Field where the facilities of the aeronautical development center will be available. It will be staffed principally by civilians.

Brig. Gen. Mervin E. Gross, former deputy to the assistant chief of air staff for personnel, is military commandant, and Ezra Kotcher, associated with AMC for the past 18 years, is director of the institute.

## Materials Shortage Prompts Cut in Department Funds

Shortage of steel and other heavy construction materials resulted in a major part of the cut which the House Appropriations Committee last week ordered in the Interior Department funds for 1947. The bill has still to be approved.

Conceding that its cut of nearly 50 per cent in the overall appropriation for the department is "unprecedented," the committee pointed out that the cut "is to a considerable extent made possible by the shortage of lumber, steel, and many other supplies and materials essential to the construction of buildings, dams, roads and other works, for which a total of $221,764,644 was requested in the budget estimates."



# Resisting Heat and Shock...

## BEARINGS: HYATT

PALMER-BEE

Rolls of strip steel too hot to handle by ordinary methods and equipment are moved in huge volume on the special Palmer-Bee Hot Coil Conveyor—which loads, carries and transfers this material with minimum effort and maximum time saving. In the dustproof pillow block and chain plate assemblies of these conveyors, shafts are kept in alignment and turning friction-free with Hyatt Roller Bearings.

Not only in the handling equipment of steel mills, but also in all other kinds of machinery in industry, agriculture, and transportation, shafts stay aligned and gears and wheels turn freely on Hyatt Roller Bearings—literally millions of Hyatts.

**HYATT BEARINGS DIVISION**
**GENERAL MOTORS CORPORATION**
HARRISON, NEW JERSEY

# mirrors of MOTORDOM

By A. H. ALLEN *Detroit Editor, STEEL*

***Detroit celebrates golden jubilee of auto industry in midst of work stoppages and materials shortages crippling production. Parade brings out ancients. Celebration aimed at bridging some of disunity that has marked postwar industry***

*DETROIT*

TRUE to the theatrical tradition that "the show must go on," the long-heralded automotive golden jubilee unfolded its sights and sounds to waiting thousands here last week. Wednesday evening her automotive majesty, Mary Grace Simescu, queen of the event, waved (according to advance publicity, anyway) "a wand of neutron-splitting beryllium over a tube of boron, smashing a boron atom, thus producing energy which was transmitted to the jubilee's symbol electrically to illuminate its spiralling neon conception of an atom in fission, its antique car and its modern car." The attending throng and a large radio audience was scheduled to hear the atom split.

Throughout the country lesser atoms were splitting in the form of strikes and work interruptions in hundreds of suppliers' plants which were adding to the creeping paralysis settling over automobile assemblies. But in the motor capital a valiant effort was being made to throw out disunity and strife in the interests of renewed concentration on production.

### Parade Was Highlight

One of the highlights of the jubilee celebration was a three-hour parade down Woodward avenue, central element of which was a fleet of 250 ancient and honorable automotive vehicles, about one-third of them operating under their own power, the others towed. Because their speeds could not be geared down to that of the moving parade, the powered old-timers had to do a bit of dog-legging and criss-crossing to hold their positions, and there were waiting tow trucks at almost every intersection to come to the aid of veteran buggies developing mechanical trouble.

Of the total number of antiquarians entered in the parade, a late count showed 17 Fords, 11 Oldsmobiles, nine Cadillacs, eight Maxwells, five Packards, four different models each of the Brush, Chevrolet, White and Wills-St. Clair, three each of the Hupmobile, International, Reo and Studebaker, two each of the Duryea, Dodge, Hudson, Overland, Pontiac, Pierce-Arrow and Sears.

Others of rarer vintage included a Bebe Peugeot roadster of 1914, a Breer one-seater dating back to 1901, a 1908 Black, a 1910 De Dion Benton, a California touring car of 1902, a Detroit electric, a Leland-Ford two-seater of 1902, a Humming Bird Midget, a Kiblinger roadster of 1906, a Little roadster of 1912, a 1912 Marmon, a Marr Cycle touring car of 1905, a 1914 Rolls-Royce, a Northern touring car of 1905, a 1924 Stanley Steamer, etc. Following the parade, the old vehicles proceeded to an exposition in Convention Hall which continues through June 9.

In a special salute to automotive pioneers on Friday evening, high tribute was paid to the scores of men who participated in the beginning of the motor industry. Obviously there were many overlooked but even in their anonymity they shared the honors of the occasion. Pictures of a few of these great names in motordom are reproduced herewith.

Officially, the industry was a half-century old last week, since records seem to indicate the first horseless carriages were driven on the streets of Detroit just 50 years ago by C. B. King and Henry Ford. However, prior to 1914 automobile manufacturing was in its infant stages. The Bureau of Census shows for example, that in 1899 the automotive industry ranked 150th in the country, according to "value added to the product." Its employment totaled something over 2000, and average annual wage a little under $600. By 1914 the industry had risen to seventh rank and by 1919 second.

Watching the freakish creations of the 1890s roll by and contrasting them with the sleek models of 1946, the first question the observer asks himself is: What was the stimulus behind this remarkable 50 years of progress? Primarily, of course, it was the indomitable urge to build something, to create something useful, something which might be sold at a profit. But the translation of an urge in the mind of man into the No. 1 industry of the world is another matter. Basically, it appears to be a steady and relentless march along four parallel highways—men, materials, machines and methods.

### Industrial Advances in 50 Years

In this light the golden jubilee of the automotive industry is in reality the jubilee for all American industry, for without the contributions of all industry in terms of men, materials, machines and methods there would have been no automotive industry in its present proportions. Steadily higher earnings for workers, the investment of an estimated $8000 in equipment for every man at work, the incidence and perfection of methods for mass movements of materials and parts, the epochal advances in materials, parts and finishes—they are all roadmarks on the path of 50 years.

If, upward through the glitter and glamour of Detroit's celebration last week, there rose a transcendent spirit of co-operation and determination to move ahead, which might somehow spread and fall over America from the Atlantic to the Pacific, from Canada to the Gulf, this golden jubilee will go down in history as marking a turning point in national affairs. Only the future can decide whether or not this was achieved.

Serious consequences of production curtailment among automotive suppliers are shown in a recent survey of the situation among General Motors division plants.

## Automobile Production

**Passenger Cars and Trucks—U. S. and Canada**

*Tabulated by Ward's Automotive Reports*

| | 1946 | 1941 |
|---|---|---|
| January | 121,861 | 524,073 |
| February | 83,841 | 509,332 |
| March | 140,777 | 533,878 |
| April | 249,181° | 489,856 |
| **Week ended:** | | |
| May 11 | 71,355° | 132,380 |
| May 18 | 48,565° | 127,255 |
| May 25 | 53,020° | 133,560 |
| June 1 | 40,000° | 106,395 |

°Preliminary.

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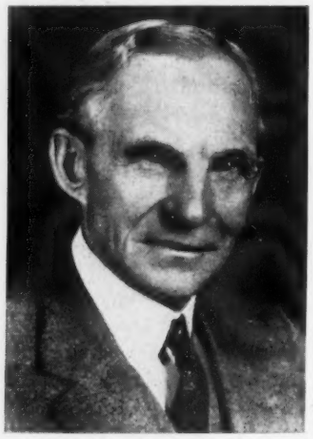
During the week ended May 18, GM plants in the U. S. and Canada have turned out 15,441 passenger cars and 6287 trucks, about one-third of present capacity. Since that time, assemblies have eased further because of supply difficulties, so a tabulation was made of the number of strikes in vendors' plants affecting the various divisions. Not including the stoppage of coal supplies, there was a total of 394 strikebound suppliers reporting. Eliminating the duplications resulting from various divisions reporting the same suppliers, a net total of 143 was compiled, individual divisions noting as many as 22 suppliers affected.

The gloomy outlook is not peculiar to GM, but instead of improving, the supply situation seems to be getting progressively worse. Plantwide shutdowns like those now in effect at Ford and Nash-Kelvinator may be the only ultimate answer. Up to May 24, GM had produced only 222,736 cars and trucks since V-J Day, against expectations of better than 1,000,000. Schedules for May, June, July and August already have been cut by 200,000, even with the assumption that immediate settlement will be worked out in coal.

## AUTOMOTIVE PIONEERS ELECTED TO HALL OF FAME

W. C. DURANT

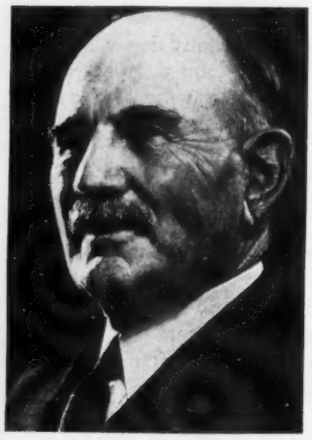
J. F. DURYEA



HENRY FORD

GEORGE HOLLEY

C. B. KING



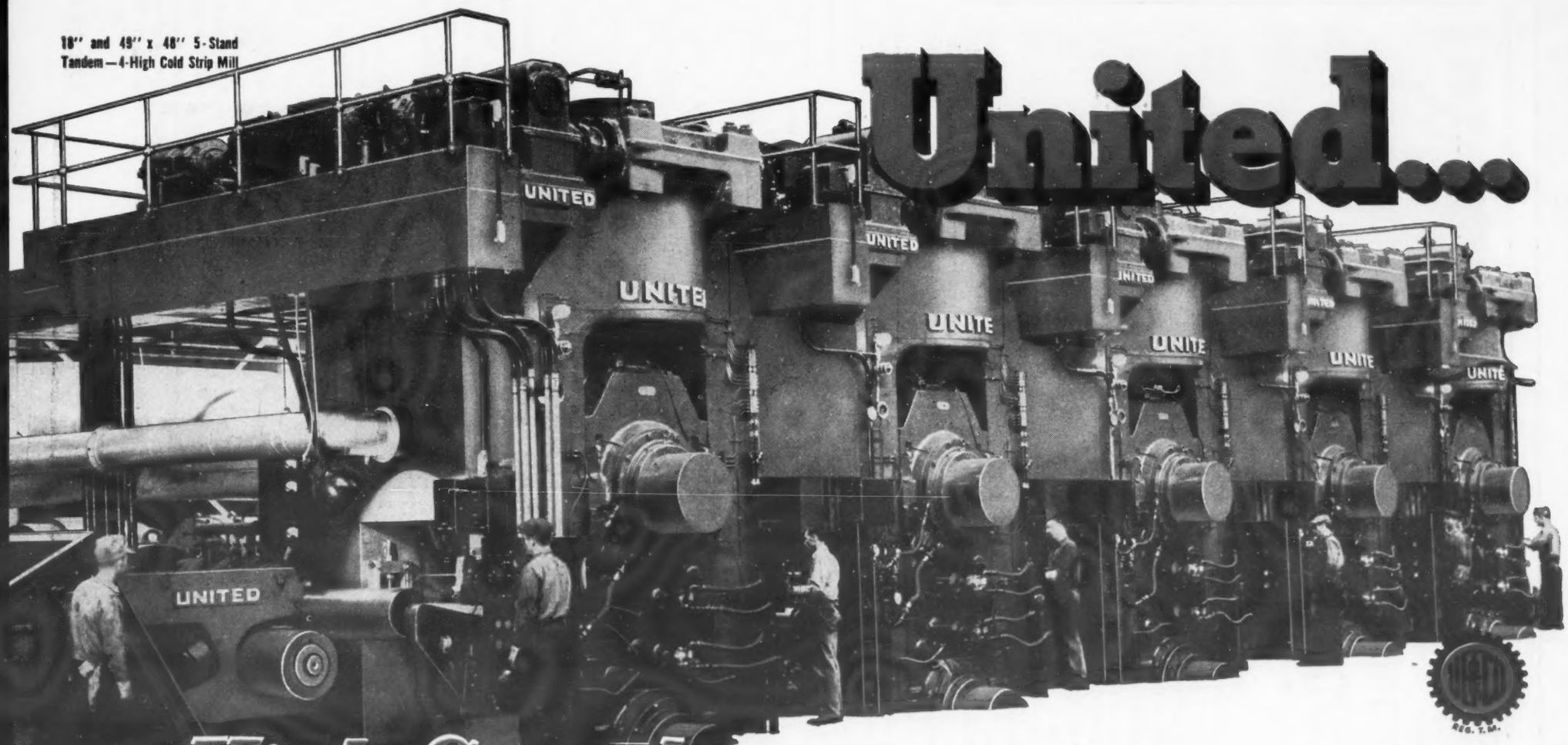
C. W. NASH

BARNEY OLDFIELD

R. E. OLDS

A. P. SLOAN JR.

18" and 49" x 48" 5-Stand
Tandem—4-High Cold Strip Mill




# United...

# High Speed 5-stand tandem cold mills

## UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at PITTSBURGH · VANDERGRIFT · NEW CASTLE · YOUNGSTOWN · CANTON

Subsidiary: Adamson United Company, Akron, Ohio

Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q. Canada

*The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment*

### FOR PRODUCTION OF SHEET AND TINPLATE STOCK

UNITED ENGINEERING and FOUNDRY COMPANY, for 40 years leader in the development of cold reduction processes, offers immediately available designs for high speed, high production, 5-stand tandem tinplate mills with finishing speeds up to 5000 F.P.M. Also available are designs for modern 4-stand and 3-stand units.

These mills embody all the latest features in auxiliary equipment including uncoilers, guides, coolant systems, tension rolls, coilers, etc.

Consult UNITED'S engineers when making plans for reconversion and expansion.

# Present Demand For Electrical Equipment Large

*Reliance Electric & Engineering Co. sales engineers survey buying factors, report few order duplications*

CURRENT expanded orders for electric motors, generators and controls represent little or no duplication of equipment orders which will be canceled in the future, according to district managers and field sales engineers of Reliance Electric & Engineering Co., who met in Cleveland recently for their first general sales conference since the war began.

The increased need for motors and other electrical controls has three major causes, in the opinion of these men: First, increased production of products regularly made before the war; second, machinery for completely new products; and, third, need for adjustable-speed equipment which will provide exactly the right speed for each operation of the machine.

Existing machinery, in many cases, is believed by manufacturers to be unsuitable for the high speed work possible with some of the new materials which are or will be available. A trend toward automatic or semiautomatic operations requiring more motors and controls is another factor of importance in plants which are buying new equipment.

A recent development on the part of buyers is the desire for the on-the-spot conversion of electric power. Controls for converting alternating current to direct current at the machine are much in demand, the sales engineers revealed.

Manufacturers are much interested in the extent to which the installation of new motor-drives can cut costs and are using these installations for modernization of existing facilities or in anticipation of future requirements.

**MOBILE X-RAY EQUIPMENT:** A worker at the Mt. Vernon, N. Y., plant of North American Philips Co. Inc. is machining a tube carriage for a mobile bedside x-ray unit. Precision work in mounting this tube makes possible the quick and exact adjustments necessary in treating a bedridden patient

## Officers of Industrial Diamond Group Named

Harvey B. Wallace, president, Wheel Trueing Tool Co., Detroit, and Adamant Tool Co., Bloomfield, N. J., has been elected president of the newly formed Industrial Diamond Association of America. Other officers are: First vice president, I. J. Meade, vice president, U. S. Industrial Diamond Corp., New York; second vice president, C. J. Koebel, president, Koebel Diamond Tool Co., Detroit; Athos D. Leveridge, executive director and secretary-treasurer. Directors include: Irving R. Berk, Midwest Diamond Sales Co., Chicago; Louis Chambre, vice president, Balloffet Dies & Nozzle Co., Guttenberg, N. J.; Stephen W. Hofman; Frank Koebel, president, J. K. Smit & Sons Inc., New York; Harold DeS. Mendes, Mendes Diamond Sales Co.; James A. Ross, president, Sprague & Henwood Inc., Scranton, Pa.; H. R. Spandel, New York; and Charles Ullmann, Associated Diamond Co., New York.

## American Can Converting St. Louis Torpedo Plant

Reconversion of American Can Co.'s former Amertorp plant in St. Louis from torpedo production to can manufacturing is being made at a cost of $5 million with present schedules calling for start of production by Sept. 1.

Cost of new construction and alteration is estimated at $500,000, and the eight metal container and five fiber container manufacturing lines which will replace torpedo production machinery will cost more than $4.5 million.

## Joshua Hendy Iron Works Buys Plant from Government

Joshua Hendry Iron Works, Sunnyvale, Calif., has purchased for $1,103,295 the plant which it operated during the war. The plant will be used for producing diesel engines, steam turbines, water control apparatus and other mechanical items. The enterprise is expected to provide jobs for 2500 persons by October.

## Wheelock, Lovejoy & Co. Celebrates 100th Birthday

Wheelock, Lovejoy & Co. Inc, Cambridge, Mass., is celebrating the 100th anniversary of its founding and in commemoration of the event has published a booklet depicting its growth.

The company started out as a partnership, Lewis Bullard & Co., "dealers in metals of all kinds," and was located close to the Boston waterfront where imported steel from England and iron from Sweden could be reshipped and copper could be exported.

The business flourished with the growing industrialization of the country and the original partnership was replaced by six other ones before the company was incorporated in 1919 under its present name.

In 1910, A. Oram Fulton, the company president since 1924, was employed to develop special alloy machinery steels. This work resulted in development of the company's "Hy-Ten" special steels, and led to the company's specialization in alloy steels for which it is well known today.

# BRIEFS . . .

*Paragraph mentions of developments of interest and significance within the metalworking industry*

**Cast Metals Corp.,** Deshler, O., has recently been organized by Doyle M. Carbin who heads the company as president and general manager. The new company, a jobbing foundry manufacturing gray iron castings, has leased its facilities from Deshler Foundry & Machine Works, Deshler, O.

—o—

**Cobra Pipe & Coil Co.,** Elmwood, Conn., has been organized by Albert Krasnow, president and treasurer, to fabricate home and commercial radiant heaters.

—o—

**Champion Foundry & Machine Co.,** Chicago, has purchased a one-story factory building in North Rockford, Ill., which will be operated as a branch, manufacturing core blowers and molding machines.

—o—

**Burgess-Norton Mfg. Co.,** Geneva, Ill., has purchased the land and buildings of Anderson-Hickey Co., that city, which will move operations to North Aurora, Ill.

—o—

**Lovejoy Tool Co.,** Springfield, Vt., has appointed the following as representatives: L. A. Benson Co. Inc., Baltimore, for Maryland, Delaware, and Washington, D. C.; and Austin Ford Logan, Buffalo, for central and western New York.

—o—

**M. E. Laganke Electric Co.,** Cleveland, has moved its offices to 5005 Euclid Ave., Cleveland 3.

—o—

**Geometric Tool Co.,** New Haven, Conn., has appointed Browning Tool & Supply Co. and Ft. Wayne Pipe & Supply Co., both of Ft. Wayne, Ind., as distributors.

—o—

**Southern Aircraft Corp.,** Garland, Tex., has converted its Dallas, Tex., plant to production of domestic gas heaters and cooling units as well as aluminum furniture.

—o—

**Scientific Section, National Paint, Varnish & Lacquer Association Inc.,** Washington, has been awarded the Naval Ordnance Development Award for outstanding work in the development of projectile and rocket paints, cavity paints, adhesives, rust inhibitive coatings, and enamels.

—o—

**Southern States Iron Roofing Co.,** Savannah, Ga., has instituted a medical aid program for the benefit of all its employees with at least five years' service, and of their dependents.

—o—

**Sciaky Bros.,** Chicago, electric resistance welding machine builder, has become an Illinois corporation and has changed its name to Sciaky Bros. Inc.

—o—

**Miles Metal Corp.,** New York, has been acquired by Milton Levenson who will take over active management of the metal brokerage company.

—o—

**Sola Electric Co.,** Chicago, has purchased from the War Assets Administration for $342,500 the plant operated by Strom Steel Ball Co., Cicero, Ill., and will use it for production of transformers for radio, radar, television and x-ray equipment.

—o—

**Triad Distributing Co.,** Birmingham, has been appointed distributor for Rusco Venetian All-Metal Awnings and will assemble and finish the product in facilities in that city.

—o—

**American Viscose Corp.,** Wilmington, Del., has awarded the contract to expand its Meadville, Pa., plant by 50 per cent to Rust Engineering Co., Pittsburgh.

—o—

**Oliver Maisch & Co.,** Chicago, consulting engineer, has incorporated and changed its name to Mechanical Products Corp. Oliver Maisch is president and treasurer; Carl Harris, vice president; and H. W. Maisch, secretary.

—o—

**River Terminal Railway Co.,** Cleveland, subsidiary of Republic Steel Corp., has been named winner of its class in the Railroad Employees' National Safety Contest of the National Safety Council.

—o—

**Yale & Towne Mfg. Co.,** New York, has plans to manufacture a patented automatic iron at its recently acquired plant in Buffalo.

—o—

**Aro Equipment Corp.,** Bryan, O., has appointed the following as jobbers for the company's line of industrial pneumatic tools: Delaware Hardware Co., Wilmington, Del.; Roekel Co., Zanesville, O.; Evansville Supply Co., Evansville, Ind.; Jacobsen & Daw, Chicago; Mortensen Industrial Supply Co., Milwaukee; Harry Lester Auto Supply Co., Big Spring, Tex.; Maxwell Motor Supply Co., Stockton, Calif.; Harmon & Marshall, San Bernardino, Calif.; and Industrial Equipment Co., Everett, Wash.

—o—

**Otis Angier & Associates,** Framingham, Mass., consultant on new methods and materials for protective packaging, has been formed by Otis Angier, formerly president, Angier Sales Corp., of that city.

—o—

**Reynolds Metals Co.,** Louisville, Ky., has arranged a $12,500,000 loan to finance the company's enlarged operations and provide additional working capital.

—o—

**King Fifth Wheel Co.,** Philadelphia, has begun installation of flash-welding equipment which will handle stainless steel up to 4 sq. in. sections and nearly all other steels up to 8 sq. in.

—o—

**St. John X-Ray Laboratory,** Califon, N. J., has moved all its facilities to its building in that city.

—o—

**Cooper-Bessemer Corp.,** Mt. Vernon, O., has announced plans for installation of new facilities which will enable its foundry at Grove City, Pa., to double production in the next four months.

—o—

**Research Laboratory, American Society of Heating & Ventilating Engineers,** New York, has been awarded the Navy's Certificate of Achievement for "exceptional accomplishment."

—o—

**Binghamton Foundry & Machine Co. Inc.,** Binghamton, N. Y., has changed its name to Binghamton Steel & Fabricating Co. Inc.

—o—

**Hewitt Rubber Corp.,** Buffalo, has changed its name to Hewitt-Robins Inc. to recognize its wholly owned subsidiary, Robins Conveyors Inc., Passaic, N. J.

—o—

**Carboloy Co. Inc.,** Detroit, has appointed Hawley Hardware Co., Bridgeport, Conn., as a distributor for its products.

## Shearing Facilities Opened At Follansbee Warehouses

Establishment of shearing facilities at the Pittsburgh and Rochester, N. Y., warehouses of Follansbee Metal Warehouses Division, Follansbee Steel Corp., Pittsburgh, has been announced by J. W. Patrick Jr., manager of warehouses.

The warehouses are also expanding their lines of flat-rolled products and will add coil slitters as soon as equipment is available.

# Geneva Mill Sale Approved on Coast

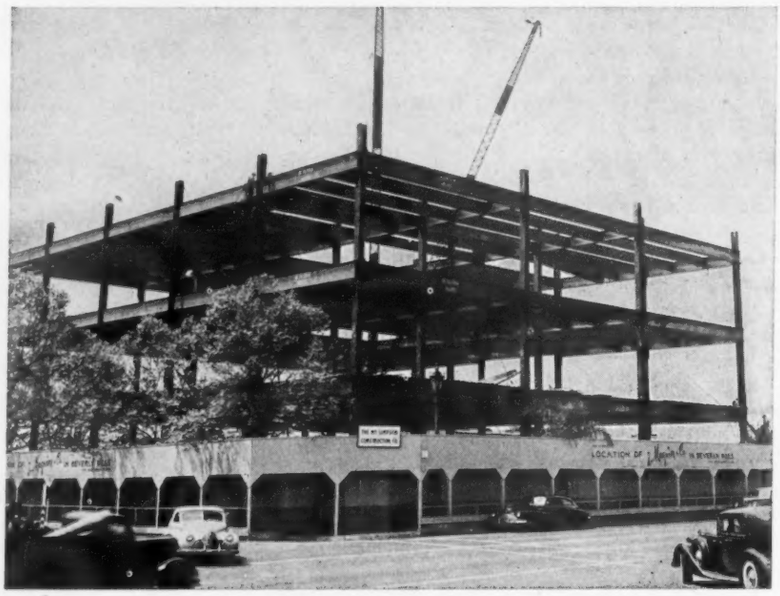
*Award of plant to U. S. Steel brings feeling of relief to Far West industrial circles. Department of Justice still must pass on sale*

SAN FRANCISCO

AWARDING by the War Assets Administration of the Geneva steel mill to U. S. Steel Corp. has brought a feeling of relief and approval throughout industrial and business circles of the Far West.

Since some nine months ago, when U. S. Steel announced that it was withdrawing from bidding because of Department of Justice charges of monopoly, there has been a general feeling of uncertainty that the plant would ever be reopened. Because Geneva is a keystone of western hopes for heavy industrialization, the award is a source of satisfaction to the many industrial interests which have been working for a broader place for the West Coast in the nation's industrial economy.

Likewise, with only a few exceptions, there is general approval of the fact that U. S. Steel Corp. was the successful bidder. In recent weeks it has been widely recognized that "Big Steel" probably more than any other steel organization has the know-how to make Geneva into a successful postwar operation. With the exception of Colorado Fuel & Iron, which placed the second most attractive bid, it also was amply apparent that U. S. Steel possessed the only adequate financial responsibility among the bidders for the plant.



**RECORD BREAKER:** Erection of this 600-ton structural steel framing was completed in record time by Bethlehem Pacific Coast Steel Corp., Los Angeles, for the Beverly Hills store of I. Magnin Co. Design of this new store makes use of wide column spacing for maximum unencumbered floor area

### Approval Is Necessary

Of course, U. S. Steel Corp. must run the gauntlet of the Justice Department before final approval is given to the sale. However, general opinion here is that the department will not press its previous charges of monopoly and that the award will be approved. Unanimous approval of the WAA and its divisions is expected to be a factor in pushing through the sale. In addition, if any hitches do develop, it is likely that considerable political pressure will be brought on the administration by western business and industrial interests which are not allied in any way with U. S. Steel, but instead have the interest of the West at heart.

This is particularly true of opinion in Salt Lake City and elsewhere in Utah. Opinion in Utah is strongly in favor of operation of Geneva by U. S. Steel.

Several days before awarding of the plant by WAA, it was reported that Assistant Attorney General Wendell Berge had delivered a lengthy opinion to Attorney General Tom C. Clark to the effect that sale of the Geneva mill to U. S. Steel would violate the antitrust laws. Although that report subsequently was tempered with another dispatch stating that Mr. Berge had not taken an official opinion on the matter, Utahans nevertheless quickly rallied to support of U. S. Steel.

Gov. Herbert B. Maw pointed out that U. S. Steel Corp. had not been considered a monopoly by the Justice Department or the courts until the question of Geneva arose. The governor said "it smacks of maneuvering of some kind that the issue of monopoly should be raised at this time in this particular manner."

Gus P. Backman, executive secretary of the Salt Lake Chamber of Commerce, urged the Utah congressional delegation to avert any ruling by the attorney general barring U. S. Steel's bid from acceptance. "If the U. S. Steel bid is ruled out," said Mr. Backman, "it is my opinion that no other prospective operator can assure Utah of continuing operation of the plant."

Several Utah groups also sent telegrams protesting erection of any technical barriers to approval of U. S. Steel's bid.

Utah, of course, has a direct interest in profitable operation of Geneva because it will provide work for its residents, both at the mill itself and in allied industries which Geneva is expected to foster nearby.

On the West Coast, there is the indirect benefit that Geneva's operation will give fabricating companies a wider range and a more adequate supply of steel. It is recognized, of course, that this will not come immediately. Several years may elapse before all the adjustments and improvements to the Geneva plant can be accomplished.

According to present plans, U. S. Steel will spend $18 million for a 386,000-ton hot-rolled coil mill at Geneva. In addition it will build a $25 million cold-rolled reduction mill at its Columbia Steel Co. plant at Pittsburg, Clif. Together with the $47.5 million which the corporation is paying for Geneva, the investment of U. S. Steel will run about $91 million, which is the largest single financial transaction in West Coast industry in a number of years.

When Columbia Steel takes over Geneva, it is expected that the company's old blast furnace operation at Provo, Utah, will be suspended, or at least placed on a standby basis. Geneva, with its three

blast furnaces and nine open hearths, has a capacity for 1,300,000 tons of ingots annually.

Geneva is so located that at equal freight rates it can serve an area in an 800-mile radius. It will be able to supply material previously not available except on the basis of imports from the East either by rail or water. Operation of the plant, too, may result in important changes in freight rate structures. As set up now, a lower freight rate from Geneva to the West Coast cities appears to be a requisite to profitable and full operation.

A number of observers here have been speculating on the competitive position of Geneva, now that it is in the hands of U. S. Steel Corp., and the Fontana plant which is run by Henry J. Kaiser. Some have pointed out that "Big Steel" doubtless has not forgotten Kaiser's agreement with the union just prior to the recent steel strike, and they forecast a bitter competitive battle at some propitious time in the future. For the present, however, demand for steel is so heavy it is likely that Fontana and Geneva together will not be able to supply all the wants.

## Bankers' President Offers Remedies Against Inflation

*LOS ANGELES*

R. L. Eberhardt, president of the California Bankers Association, said last week that "according to present indications, we are losing the battle to defeat the forces of inflation."

Speaking before the association at its 55th annual convention in Coronada, Calif., Mr. Eberhardt said that rising prices are due to excess money supply resulting from government fiscal policies.

The remedies, he averred, are twofold: First, boosting of interest rates on government bonds so that private investors will prefer the bonds to consumer goods; second, increased taxes.

"This second step should not be taken unless the first is put into effect beforehand," he declared.

## Steel Sheet Mill Planned By Appliance Manufacturer

*LOS ANGELES*

O'Keefe and Merritt Co., Los Angeles, largest appliance manufacturer on the Pacific Coast, last week announced plans to build a 50,000-ton steel sheet mill in Maywood, Calif.

The company plans to solve its reconversion problem as to sheet procurement and to market any excess production.

Beyond stating that land has been purchased for the mill in the central manufacturing district of Los Angeles, no details of the construction program have been made public.

## Last B-29 Produced; Boeing To Build More Powerful B-50

*SEATTLE*

Superfortress No. 1119, the last B-29 produced in the United States, has rolled off the Boeing assembly line at Renton, Wash. Boeing will hereafter fabricate the B-50 a more powerful version of the four-motored bomber. The Renton plant will be turned back to the War Assets Administration June 1 as surplus. Future operations will be conducted at Plant No. 2, Seattle. The Mead magnesium plant at Spokane, operated during the war by the Electro-Metallurgical Co., has also been declared surplus and the contract terminated as of June 17. Electro-Metallurgical has a 6-months option to buy. The Columbia Metals Corp., Seattle, is reported interested in it for conversion to production of fertilizer.

As of May 16, unemployment claims in Washington state dropped 4.7 per cent in a week but subsequent strikes have undoubtedly increased worker idleness. Canneries and lumber plants report labor shortages. Unemployment compensation to veterans decreased nearly 1000 during the week ended May 16.

A major industrial project totaling $11 million and involving 11 plant structures for the Crown-Zellerbach Corp. at Camas, Wash., has been approved by the Civilian Production Administration. An unstated tonnage of steel is involved which likely will be fabricated by Portland plants.

Considerable tonnages of shapes and reinforcing are involved in a number of Washington state highway projects for which bids have been opened and no action taken. Prices are considerably above engineers' estimates and action will be deferred until the situation is adjusted.

## Wendt-Sonis Opens Carbide Tool Factory in California

Wendt-Sonis Co., Hannibal, Mo., has opened a new plant for the manufacture of carbide cutting tools at Hawthorne, Calif. The building, including warehouse, is located at 580 North Prairie Ave.

Now in production, the new plant includes complete design and engineering facilities to provide adequate service for carbide cutting tools.

**NO RIDERS:** Standing in long lines of idleness are these cars and trucks, many with flat tires, stored in the open at the Army Ordnance Depot at Stockton, Calif. Although vehicles remain scarce in the civilian market, the demobilization program has not yet reached these. NEA photo

# MEN of industry

**R. G. Rehder** has been made president and treasurer, Uddeholm Co. of America Inc., New York, succeeding **E. T. Corbus** who is now chairman of the board. Mr. Rehder for the last 21 years was head director of the Uddeholm General Agency Ltd., Birmingham, England.

—o—

**Col. J. F. Drake,** president, Gulf Oil Corp., Pittsburgh, was re-elected chairman, National Industrial Conference Board, New York. **Dr. Virgil Jordan,** serving as president since 1932, was re-elected, as was **Neal Dow Becker,** president, Intertype Corp., Brooklyn, N. Y., as chairman of trustees. Vice chairmen of the Conference Board re-elected are: Mr. Becker, **Edgar M. Queeny,** chairman, Monsanto Chemical Co., St. Louis; **Harry E. Ward,** chairman, Irving Trust Co., New York; and **Arthur M. Collens,** president, Phoenix Mutual Life Insurance Co., Hartford, Conn., was elected to succeed **Langbourne M. Williams Jr.**

—o—

**William J. Grede,** president, Grede Foundries Inc., Milwaukee, has been elected a director, National Association of Manufacturers.

—o—

**Howard L. Boetsch** has been named to head Penflex Sales Co., Philadelphia, a new organization to handle all sales activity of Pennsylvania Flexible Metallic Tubing Co., Philadelphia. Branch sales offices of the new company will be located in New York, Boston, Cleveland, Chicago and Houston, Tex. Its affiliate, U. S. Flexible Metallic Tubing Co., will act as West Coast sales outlet with offices in Seattle, Portland, Oreg., San Francisco and Los Angeles.

—o—

The following have returned to Timken Roller Bearing Co., Canton, O., following service with the armed forces: **R. G. Harmon,** field engineering, Chicago; **D. G. Gibson,** field engineering, Cincinnati; **S. T. Salvage,** assistant district manager, Industrial Division, Cleveland; **R. L. Williams,** field engineer, Cleveland; **F. J. Hartshorne,** field engineer, Milwaukee; and **L. M. Meyer,** field engineer, Pittsburgh. **L. H. Gegenheimer,** who served with the War Production Board, now is district manager, Industrial Division, Boston.

—o—

Ilg Electric Ventilating Co., Chicago, announces the following appointments to its sales engineering staff: **G. K. Wood,** manager, Columbus, O.; **A. B. Davis,** Charleston, W. Va.; **Carl E. Brock Jr.,** Pittsburgh; **Frank Taylor,** New Orleans.

—o—

**Philip Donham,** vice president and secretary-treasurer, Electro Refractories & Alloys Corp., Buffalo, has resigned after five years with the company.

—o—

**C. C. Brooks,** western manager, Hoisting Machinery Division, Robins Conveyors Inc., Passaic, N. J., has retired after 12 years' service with the company.

—o—

**Robert F. Golden** has been appointed head of the newly established research and development department, Eaton Reliance Division, Eaton Mfg. Co., Cleveland. The new department will be located at Massillon, O. Mr. Golden was formerly assistant to the president, National Lock Washer Co., Newark, N. J.

—o—

**Robert G. Willaman** has been appointed sales manager and member of the board of directors, Peterson Steels Inc., New York. Mr. Willaman had been connected with Copperweld Steel Co., Glassport, Pa., since 1940.

—o—

**T. W. Prokop** and **A. S. Freund** have been elected secretary and treasurer, respectively, Max Schlossberg Co., Chicago. **Max W. Mabel** has been appointed supervisor of the newly established Scrap Aluminum Brokerage Division.

—o—

**C. L. Otremba,** Montgomery Ward & Co., Chicago, has been elected president, Purchasing Agents Association of Chicago. **William A. Macnider** is the new first vice president, and **W. B. Burnet,** Imperial Brass Mfg. Co., Chicago, second vice president. **L. R. Seen,** Borg & Beck Division, Borg-Warner Corp., Chicago, and **Harry H. Wise,** Scovill Mfg. Co., were re-elected secretary and treasurer, respectively.

—o—

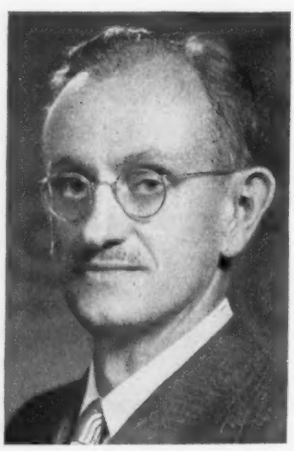
Morgan Engineering Co., Alliance, O., announces the following changes in its official personnel: **A. F. Morris,** chairman of the board; **W. H. Morgan Jr.,** president; **A. T. Davis,** vice president and sales manager; **C. E. Bertolette,** assistant secretary and treasurer; and **M. E. Rhue,** general production manager.

—o—

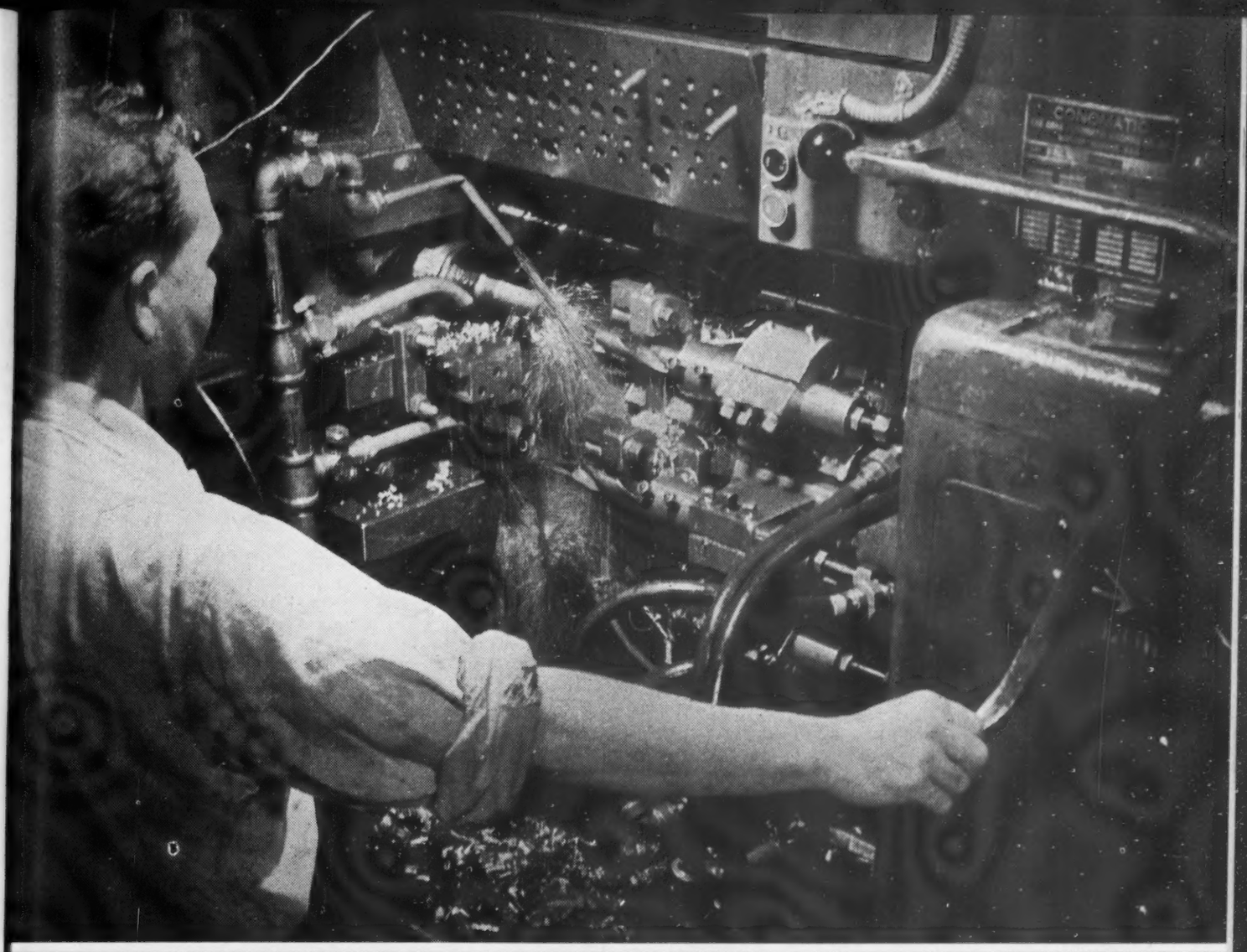
**Howard F. MacMillin** has been elected vice president, Bryant Machinery & Engineering Co., Chicago. From 1921 through 1944, Mr. MacMillin was connected with Hydraulic Press Mfg. Co., Mt. Gilead, O., and from 1938 was its president and general manager. In 1945

HOWARD L. BOETSCH

ROBERT F. GOLDEN



HOWARD F. MacMILLIN



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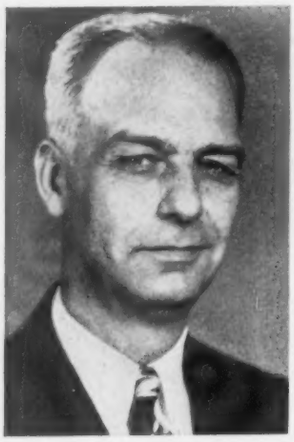


JOHN S. GOODMAN

A. P. HALL

COL. GEORGE F. FERRY

he became affiliated with Arthur D. Little Inc., Cambridge, Mass., and he is continuing a connection with that company.

—o—

**John S. Goodman** has been appointed sales manager, Industrial Division, Kerr Dental Mfg. Co., Detroit. He will take charge of sales of the materials and equipment needed to apply precision casting techniques to industrial production.

—o—

**Edmund F. Martin** has been appointed an assistant general manager of the Lackawanna plant, Buffalo, Bethlehem Steel Co. Mr. Martin formerly was assistant superintendent of the company's Saucon Division. **Albert H. Shonkwiler** also is an assistant general manager of the Lackawanna plant.

—o—

**Joseph C. Walker** has been elected president, **Colman Curtiss Jr.**, vice president, **S. C. Wead**, secretary and treasurer, Buffalo International Corp., a subsidiary of the Buffalo Bolt Co., North Tonawanda, N. Y.

—o—

Buffalo Bolt Co., North Tonawanda, N. Y., has elected the following officers: **Raymond K. Albright**, chairman; **Rudolph B. Flershem**, president; **Charles L. Turner, John J. McLaughlin**, vice presidents; **S. C. Wead**, secretary and treasurer; **Charles O. Cornell**, comptroller; **Ralph B. Plumb**, assistant secretary; and **J. E. Murphy**, assistant treasurer.

—o—

**Edwin L. Ramsey**, superintendent of steel production, Wisconsin Steel Works, Chicago, has been elected chairman, National Open Hearth Steel Committee, American Institute of Mining & Metallurgical Engineers, New York. Mr. Ramsey succeeds **A. P. Miller**, general superintendent, Inland Steel Co., Chicago. **W. C. Kitto**, superintendent, Steel Division, Pittsburgh Steel Co., Pittsburgh, has been elected vice chairman of the Open Hearth committee. **Frank T. Sisco**, secretary-treasurer since 1942, was re-elected, and **Ernest Kirkendall** was appointed assistant secretary.

—o—

**A. P. Hall** has been elected vice president, American Chain & Cable Co. Inc., Bridgeport, Conn. Before joining the company in 1944, Mr. Hall had been in the steel industry for 22 years. He will continue his present duties as general manager of sales, and his headquarters will remain in New York.

—o—

**Thomas Lekich** has been named director of purchases, and **George Wolfe**, purchasing agent, Copco Steel & Engineering Co., Detroit. Prior to his present appointment, Mr. Lekich was in the company's sales department for two years. Mr. Wolfe was released recently from the Army.

—o—

**Charles J. Surdy** has been elected vice president, Standard Stoker Co., New York. He had been executive assistant to the general manager and assistant to the president. In his new position he will direct development, research and export sales.

—o—

**Bryon C. Foy**, who resigned recently as vice president, Chrysler Corp., Detroit, has been elected chairman of the board, Jack & Heintz Precision Industries Inc., Bedford, O. At a recent meeting of the board of directors following merger of Jack & Heintz Precision Industries Inc., with the Eisemann Corp., Brooklyn, N. Y., in addition to Mr. Foy, the following were elected officers: **William S. Jack**, president; **Edward R. Legg**, executive vice president in charge of sales; **A. Ricker**, vice president in charge of finance; **Ralph M. Heintz**, vice president in charge of engineering; and **W. R. Jack**, vice president in charge of aviation sales. The Eisemann company continues operations as the Eisemann Division.

—o—

**Col. George F. Ferry**, recently released from the Army, has been appointed superintendent, standard structural mills, South Chicago, Ill., plant, Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Ferry has been associated with U. S. Steel subsidiaries for 30 years.

—o—

**Herbert C. Stockham**, president, Stockham Pipe Fittings Co., Birmingham, has been elected to the board, National Association of Manufacturers, New York.

—o—

**T. H. Benners Jr.**, T. H. Benners & Co., has been elected chairman, Birmingham District Chapter, American Foundrymen's Association. **W. E. Jones** was elected vice chairman, and **Fred K. Brown**, secretary-treasurer.

—o—

**Joseph H. Callan** has resigned as a director of Crucible Steel Co. of America. He was a director for eight years, and chairman of the executive committee of the board for more than a year.

—o—

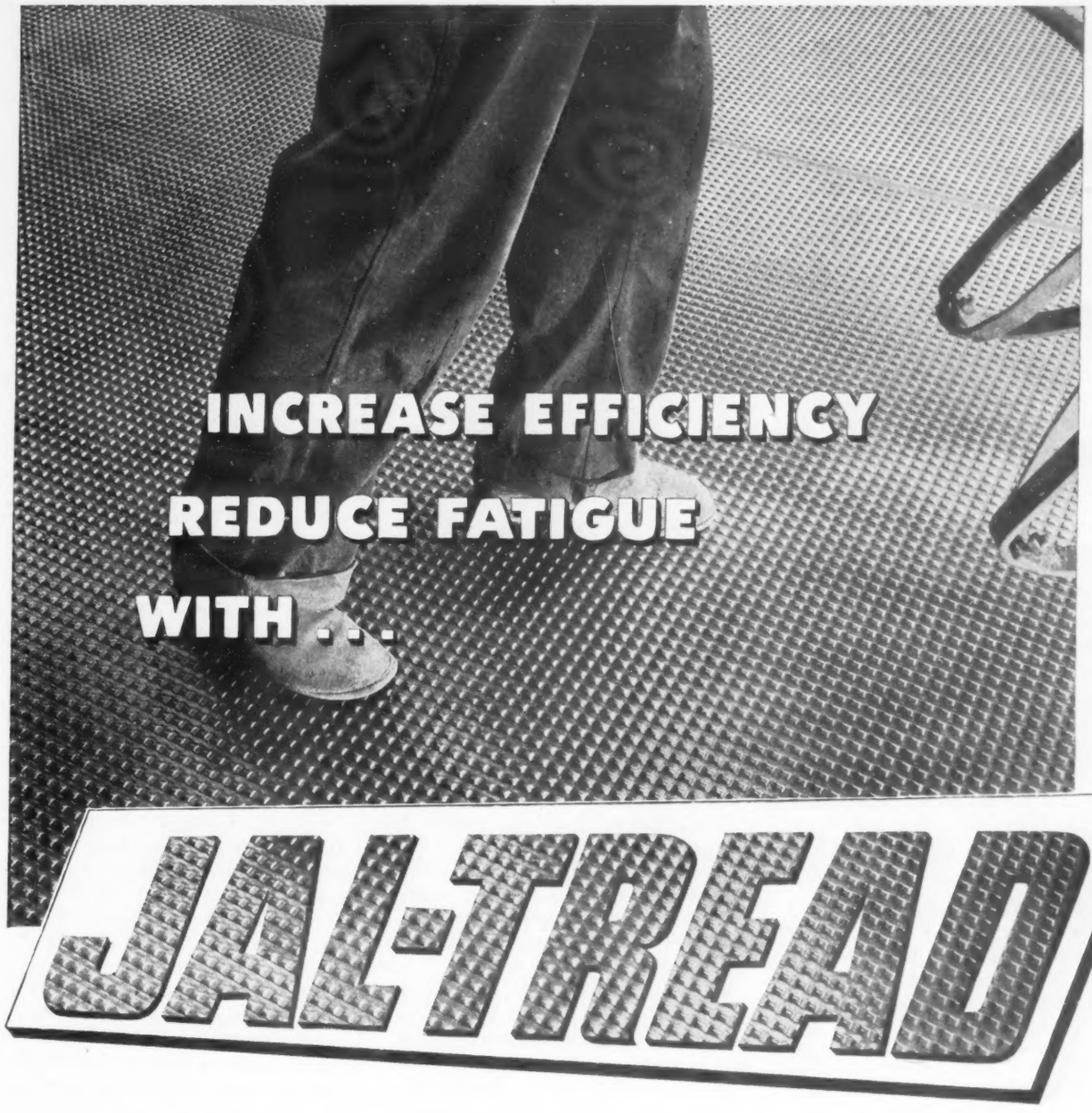
**Jerome N. Gehred**, engineering executive, Ekco Products Co., Chicago, recently was awarded the Naval Ordnance development award for his work in the development of the 3"/70 cartridge case.

—o—

**H. M. Lowe** has been named assistant parts and service manager, Nash Motors Division, Nash-Kelvinator Corp., Detroit.

—o—

**William G. Aasgard** has been named northern district operating manager, with headquarters in Minneapolis, Graybar Electric Co. Inc., New York. He replaces **H. D. Dalquist** who is retiring after 35 years with the company. **Edward R. Yonkers** has been appointed as-

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PITTSBURGH 30, PENNSYLVANIA

sistant district manager at Detroit; **Day L. Harper** succeeds Mr. Yonkers as manager at Omaha, Nebr.; **Paul D. Barber** becomes manager at Duluth, Mr. Harper's former post.

—o—

**Garrett A. Connors,** vice president, Pittsburgh Steel Co., Pittsburgh, in charge of industrial and public relations, also has been placed in charge of the company's advertising program, following resignation of **Elmer T. Wible,** manager of product promotion. **Lester W. Gaupp** has been named office manager-advertising.

—o—

**Walter D. Appel** has been named assistant to the vice president of engineering in charge of product development, Willys-Overland Motors Inc., Toledo, O.

—o—

**H. H. Wunderlich** has been appointed an assistant controller, Jones & Laughlin Steel Corp., Pittsburgh. Mr. Wunderlich formerly was assistant to the executive vice president of the company.

—o—

**R. B. Hammond** has been appointed general manager, secretary and treasurer, and **E. W. Schoen** metallurgical engineer, Bellevue Industrial Furnace Co., Detroit. For the last 20 years Mr. Hammond has been with Fisher Body Division, General Motors Corp., Detroit.

—o—

**Ralph L. Wilcox** has been appointed assistant factory manager of the Detroit plant, Gerity-Michigan Die Casting Co. During the war, Mr. Wilcox served as zinc consultant to the War Production Board in Washington.

—o—

**L. C. Andersen,** secretary-manager, Portland Iron Works, Portland, Oreg., has been elected president of United Metal Trades Association, Portland. He succeeds **Robert L. McCulloch,** McCulloch & Sons, Portland, president for the past two years. **Edward G. Huffschmidt,** Western Foundry Co., Portland, was elected vice president, and **John L. Stevenson,** Steel Tank & Pipe Co. of Oregon, a division of American Pipe & Construction Co., treasurer.

—o—

**Stewart Q. Larsen** has been appointed chief engineer, Midwest Body & Mfg. Division, Paris, Ill. He has been connected with truck, truck body and trailer body manufacturing since 1917.

—o—

**Herbert T. Florence** has been elected president and general manager, Cleveland Crane & Engineering Co., Wickliffe, O. He has been general manager of the company since 1938, and was vice president since 1941. **A. C. Garnett,** formerly secretary and treasurer, was named vice president and treasurer. **W. G. Wehr** has been named secretary, and **W. D. Vanderbilt** assistant secretary.

—o—

**James C. Brakefield** has resigned as manager of the Gadsden, Ala., Chamber of Commerce, effective June 1, to become secretary of the New Development Division, Birmingham Chamber of Commerce, which is instituting a vigorous campaign for new industries for that city.

—o—

**John L. Connolly,** secretary and general counsel, Minnesota Mining & Mfg. Co., St. Paul, has been elected a director of the company. The following men are newly elected vice presidents of the company: **Clarence B. Sampair,** general production manager; **Louis F. Weyand,** general manager, Adhesives & Coating Division; and **Lloyd A. Hatch,** manager, Roofing Granules Division.

—o—

**Jasper Van Opynen Jr.** has been appointed vice president in charge of manufacturing operations for all divisions of Portable Products Corp., Pittsburgh.

—o—

**C. C. Pearson** has been appointed eastern representative and assistant to the president in New York, Douglas Aircraft Co. Inc., Santa Monica, Calif. Mr. Pearson was manager of the company's Oklahoma City, Okla., plant.

—o—

**W. B. Herbert** has been made vice president and general manager of the New York office, Cinrock Machinery Inc., a machine tool dealer in the New York area. All the other officers of the company were re-elected and are as follows: President, **F. J. Fields,** who is vice president and general manager, Sidney Machine Tool Co., Sidney, O.; vice president, **G. H. Matthews,** who is sales manager, Mattison Machine Works, Rockford, Ill.; treasurer, **A. Triebel,** who is vice president, Rockford Machine Tool Co., Rockford, Ill.; and secretary, **C. E. Linden,** who is general manager, Fosdick Machine Tool Co., Cincinnati.

CHARLES W. PERELLE

*Who has been elected president, Gar Wood Industries Inc., Detroit, and noted in STEEL, May 20 issue, p. 106.*

—o—

**James P. Stewart** has been appointed special representative for centrifugal blowers and compressors, De Laval Steam Turbine Co., Trenton, N. J. Mr. Stewart for many years was connected with Elliott Co., Jeannette, Pa., and more recently was assistant general manager, B-W Superchargers Inc., Milwaukee, a division of Borg-Warner Corp.

—o—

**Frederick A. Stevenson,** president, American Car & Foundry Co., New York, has been elected a member of the executive committee of the company.

—o—

**James E. McNeely Jr.,** recently released from the Army, has joined the sales and engineering department, New York & New Jersey Lubricant Co., New York, as the firm's representative at Gastonia, N. C.

—o—

**Harry E. Blythe** has been elected president, Galanot Products Co., Alliance, O.

—o—

**Dr. William A. Mudge,** assistant director of technical service, New York, Development & Research Division, International Nickel Co. Inc., New York, has been elected chairman, New York chapter, American Society for Metals. During the past year, Dr. Mudge has been chairman of the group's technical program committee.

—o—

**Laurence H. Hahn,** metallurgist, Sivyer Steel Castings Co., was elected president, Chicago Chapter, American Foundrymen's Association. He succeeds **J. C. Gore,** Chicago representative, Werner G. Smith Co., who becomes a member of the board of directors. **Fred B. Skeates,** foundry superintendent, Link-Belt Co., was elected vice president, and **L. C. Smith,** Chicago representative, Peninsular Grinding Wheel Co., was chosen secretary.

—o—

**C. A. Rolfes** was elected vice president in charge of sales and a member of the board of directors, Heekin Can Co., Cincinnati. **A. F. Rassenfoss** was elected secretary-treasurer and director. Mr. Rolfes has been in charge of sales and development for the last

JAMES M. UNDERWOOD

*Who was elected recently president, Vulcan Mold & Iron Co., Latrobe, Pa., noted in STEEL, May 27, issue, p. 85.*

HENRY M. REED JR.

*Vice president and general manager of manufacturing, American Radiator & Standard Sanitary Corp., Pittsburgh, STEEL, May 13 issue, p. 82.*

MALCOLM P. FERGUSON

*Who has been elected president, Bendix Aviation Corp., Detroit, noted in STEEL, May 27 issue, p. 80.*

five years. Mr. Rassenfoss formerly was general sales manager and will continue to retain an interest in sales accounts with which he has been associated for many years. **J. G. Cahill** has been named sales manager of the general line and lithographed can sales for the company. **Charles L. Heekin** has been appointed manager of packers can sales, and **Edward J. Nolan,** assistant to the vice president in charge of sales.

—o—

At the annual meeting of the board of directors of the Wire Association, the following officers were elected for the 1946-47 term: President, **R. M. Hussey,** superintendent, wire department, Jones & Laughlin Steel Corp., Pittsburgh; vice president, Ferrous Division, **N. C. Harrison,** vice president, Atlantic Steel Co., Atlanta, Ga.; vice president, Nonferrous Division, **H. B. Carnahan,** assistant works manager, Canada Wire & Cable Co. Ltd., and Standard Underground Cable Co., of Canada Ltd., Toronto, Ont.; and executive secretary, **Richard E. Brown,** publisher, *Wire and Wire Products,* Stamford, Conn.

—o—

**Paul H. Fox** has been appointed divisional manager, aluminum sales for the central states area, Reynolds Metals Co., Richmond, Va. He will have headquarters in Chicago. Mr. Fox joined the company in 1941, and, prior to this appointment, had been serving as division manager for Washington, Oregon, Wyoming, Montana and Idaho. **Harry J. Williams** has been named eastern sales manager of the company's Foil Division, with his headquarters in New York. He succeeds **V. W. Moody Jr.,** who has been transferred to headquarters at Richmond. **J. F. Van Kennen** has been named assistant general sales manager of the company's Aluminum Division, in charge of products, with headquarters in Louisville. Since 1943, Mr. Van Kennen had been divisional manager for Reynolds' aluminum sales, with offices in Chicago.

—o—

**Robert H. Davies** has been appointed to head a new Engineering Division of Parker Appliance Co., Cleveland, which will combine the previously separate functions of product development, product engineering and technical service. Mr. Davies has been manager of technical service for the company. **Emmett C. Hartley,** who has directed Parker's research and product design activities, has been named manager of a new Special Products Division. **Leland H. Schmohl,** a company veteran of 16 years, has been appointed chief design engineer in the new Engineering Division.

—o—

**J. M. Matthews** has been named manager of silicon steel sales, Allegheny Ludlum Steel Corp., Brackenridge, Pa. Mr. Matthews was formerly district manager of the company's Buffalo territory. **W. H. White** has been appointed manager of tool steel sales for the company's Detroit district, with headquarters in Detroit. **C. R. Mitchell,** formerly assistant district manager at New York, has been appointed district manager of the Buffalo territory. **C. H. Vaughan,** formerly manager of tool steel sales, Detroit, has been named manager of the Birmingham district, with **C. H. Nesbitt** assistant district manager. **W. A. Peterson,** Tool Steel Division, has been transferred from Chicago to the Milwaukee district.

—o—

**H. A. Roemer Jr.** has been elected president, Detroit Seamless Steel Tubes Co., Dearborn, Mich., and **J. H. Dunbar,** chairman of the board. **H. A. Roemer,** chairman, has resigned. The company's new president joined the organization in May, 1945, as executive vice president, previously having been assistant general manager of sales, Pittsburgh Steel Co. Mr. Dunbar has served as president of the Detroit company for ten years.

## OBITUARIES...

**John T. Chidsey,** 79, chairman, Veeder-Root Inc., and Holo-Krome Screw Corp., both of Hartford, Conn., died at his home in Sarasota, Fla.

—o—

**David J. Harris,** 75, president, Hewitt Metals Corp., Detroit, died recently. Mr. Harris had been president of the company for the past 22 years, and was associated with the babbitt metal and solder business for approximately 45 years.

—o—

**John A. Stavola,** 71, father of **Michael J. Stavola** of M. J. Stavola & Co., Danbury, Conn., died recently. Mr. Stavola started in the scrap business approximately 50 years ago, the business being taken over by his son Michael.

—o—

**William B. Patterson,** 89, until his retirement in 1945, president and treasurer, Patterson Tool & Supply Co., Dayton, O., died recently at his home in that city.

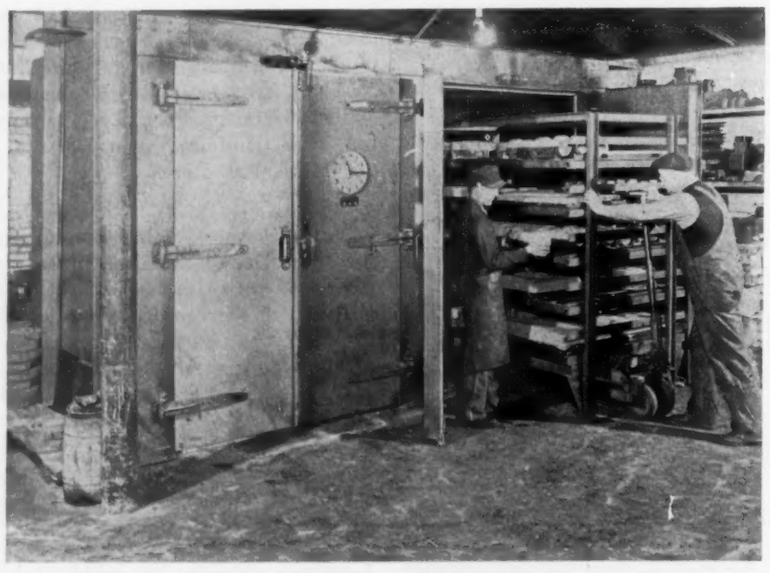
—o—

**John F. Maxwell,** 54, sales manager, Roadmaster Products Co., Chicago, died in Lansing, Mich., recently.

# ENGINEERING NEWS *at a glance*

ORIGINALLY used to finish cylindrical, conical and flanged surfaces, Roto shaving, developed by National Broach & Machine Co., is now being used to successfully finish the OD of rotors for electric motors. Shaving the latter by means of fine pitch cutters eliminates tendency to close the rotor laminations; therefore, no final operation is needed to reopen them, the Detroit company reports. In addition, the process is accurate and fast. For example, cutting time of a processed rotor was 12 sec. Laminations had a 2 9/16-in. face width and 2 ¾-in. OD from which 0.020 stock was removed. The OD was held to a tolerance of 0.0005 in. The commutator had 1 1/16-in. face width and 1 11/16-in. OD from which 0.050 stock was removed. The diameter was held to a tolerance of 0.0005.

EARL G. WHITE, maintenance inspector of chain and cable hoisting equipment in the Gary, Ind. sheet and tin mill, Carnegie-Illinois Steel Corp., decided excessive wear on the magnet chains was causing too many replacements. He figured that the 60° twist of a standard chain under operating stress caused excessive wear which soon made the chain unsafe to use. So he designed a special link for attaching the chain assembly to the magnet lug that compensated for the 60° twist. Each chain assembly now has one straight link, a left-hand twisted link and a right-hand twisted link. This permits a straight-line pull under a load. Chains formerly replaced in 4 months now last 12 months or longer. According to the company, Mr. White patented his idea and assigned it to Carnegie-Illinois.



FIVE TIMES as many cores per day at 40 per cent lower cost resulted with installation of this batch core-baking oven in the South Park Foundry & Mfg. Co., South St. Paul, Minn., Despatch Oven Co. of Minneapolis, reported recently. Direct-fired gas oven not only boosted core production 500 per cent but also eliminated "green" cores, cleaned up the core room 100 per cent and made core baking an automatic process, it is said. Molds baked by the foundry are used for tractors, scales, bell housings, printing and mill presses

ONE of the large steel producers in the "steel capital" of the country is talking seriously of installing a battery-powered plant truck that will have rated capacity of 60,000 lb. This means the wheels not only would carry the 60,000-lb load, but also a counterbalancing weight of similar amount. Frame and load-handling mechanism would weigh an additional 10,000 lb, making weight on forward wheels, 20 in. wide and 36 in. in diameter, at full load—130,000 lb. Estimated cost of constructing special flooring necessary for operation of such a huge truck is believed to be insignificant when compared to cost of other types of movers of equal capacity.

DEVELOPMENT of a mold base which will expedite molding of plastic products is reported by I. T. Quarnstrom, president, Detroit Mold Engineering Co. The base is said to permit running more mold cavities in the same amount of die area and, due to its cooling feature, to allow faster operation of presses. The Detroit concern expects to make the development available to the trade in about two months, it is said.

EXCELLENT results on abrasive operations on all types of steels and most other metals are produced using a recently developed water-soluble grinding fluid made available by Quaker Chemical Products Corp., Conshohocken, Pa., for use with its Microgrind process. The fluid, even when mixed with extremely hard water or when used in connection with grinding cast iron, does not develop rancidity or odors, the company reports. Furthermore, it has a highly detergent action on abrasive wheels.

AN EXTREMELY dense, phosphate coating on ferrous metals is provided by a chemical surface treatment currently developed by American Chemical Paint Co., Ambler, Pa. It is said to prepare metal surfaces with a durable foundation for organic finishes, one that holds paint

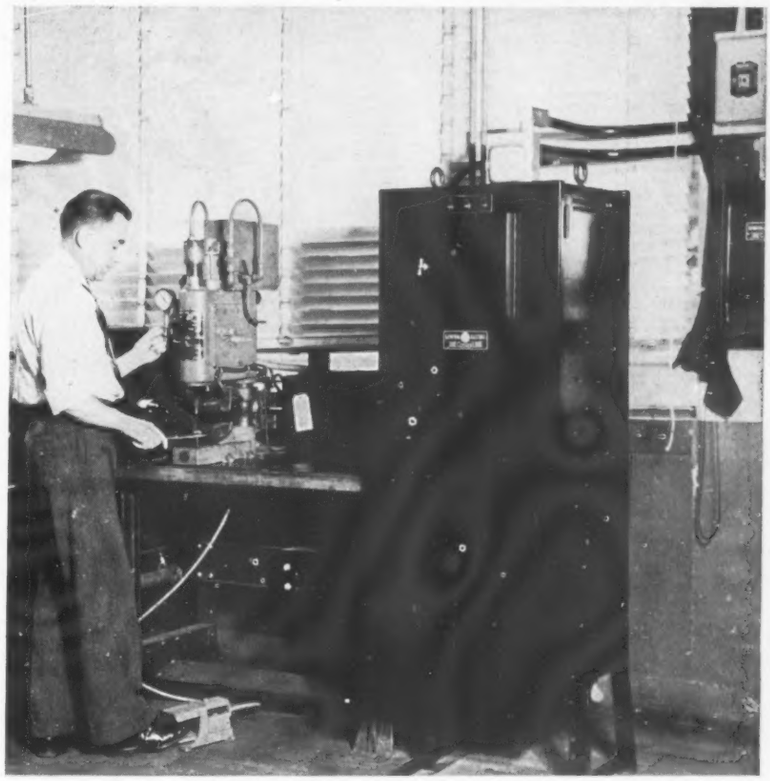
with "bulldog" tenacity. Even if the metal surfaces are not to be painted, the immersion process called Thermoil-Granodine, minimizes effects of friction or renders them corrosion resistant when oiled, the company reports. Development's ability to minimize friction was revealed in a case study when a set of untreated piston rings was run for a half hour at warm-up speed and 1 hour at 3800 rpm. Average wear was 0.075 in. as against 0.034 to 0.038 in. in case of the treated set.

FROM Schenectady, N. Y., it was learned that General Electric Co. supplied the main generators, motors and controls for 60 to 70 per cent of the submarines operated by the United States fleet during the war. According to W. H. Wild of the company's Federal and Marine Division, GE furnished the equipment for 174 submarines built for the Navy during the past 12 years out of a total of 275 subs contracted for during that period.

A MOLDED synthetic rubber cap or cup which when applied to the slightly flared end of an oil tube or line, not only permits easy, one-hand oiling of equipment, but also holds a supply of oil, allowing latter to seep slowly to the bearing. The dome-shaped cup now being produced in colors by Eynon-Daking Co., Detroit, is said to exclude dust and dirt by its tight sealing feature when the oil can spout is removed from its slit-type opening. Development is permanently fastened to the oil line by a combination of mechanical interference fit and synthetic cement.

INFORMATION often sought by engineers and production men is included in a booklet recently published for Salem Engineering Co, Salem, O. It contains informative matter on circular soaking pits, various types of heating furnaces and auxiliary equipment developed by the concern. The company also includes in the publication a number of installation pictures, tables and charts on temperature conversion and thermal efficiency of fuels.

DETAILS of a German carbothermic process for extracting aluminum from clay reveal that alumina is reduced at high temperatures in a centrifugal furnace using carbon, in form of coal dust, as the reducing agent. The furnace revolves fast enough to keep the molten bath against the sides by centrifugal force. This protects the refractories from the intense heat of an oxygen reinforced powdered coal flame. An excess of dry coal is added as a reducing agent. According to Dr. Wilhelm Patterson, director Leipziger-Leichtmetall-Work, near Leipzig, who described the process to a Department of Commerce agent, the ends of the furnace shell are double and water cooled to protect them and the end brickwork from the high temperatures. A variable-speed drive brings the furnace slowly up to speed and varies the operating speed for best performance.



AT the Kollsman Instrument Co. plant in Elmhurst, N. Y., novel use is being made of the illustrated Taylor-Winfield bench welder in developing refined aircraft instruments. The machine is installed in the experimental lab so technicians have a production machine available when needed in redesigning air speed indicators, combination dual tachometers and synchroscopes among other precision products. Main Elmhurst plant includes a special non-magnetic building for accurate compass assembly

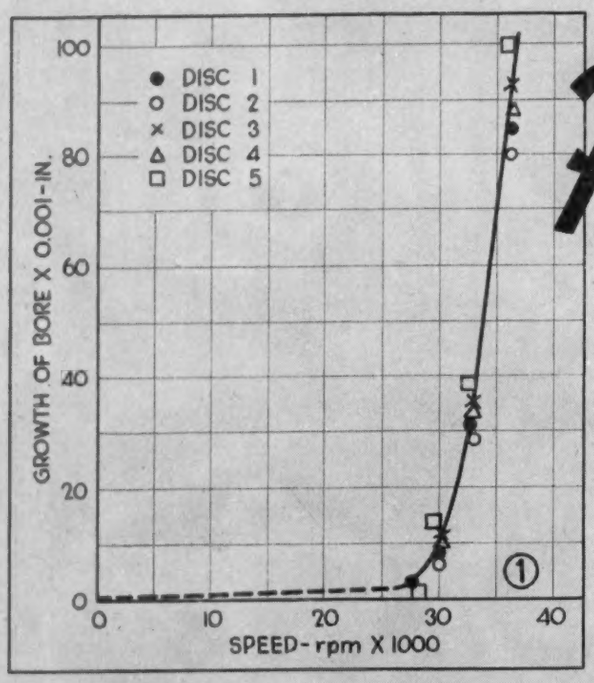
NEWEST tensile and compression tester now being produced by W. C. Dillon & Co., is reported to test numerous items—from nylon threads used in women's stockings to steel wire and castings. The tester handles loads up to 10,000 lb, and the price placed on it by the Chicago firm is within the range of many small company budgets. It can be used by welding and wire shops, plastic makers and by almost any other type of industrial concern.

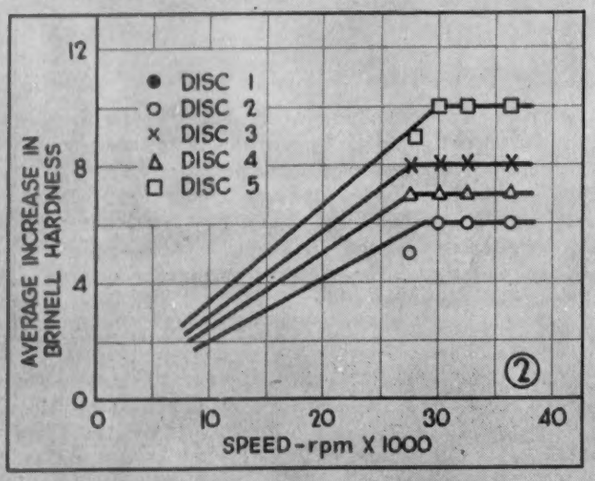
ELECTRODE coatings are used to perform as many as seven different jobs in the welding process, according to the "Electrical Review" published by Allis-Chalmers Mfg. Co., Milwaukee. They serve as a mechanical support for the molten pool in vertical or overhead welding, aid in striking an arc, provide an ionized gaseous conductor to help maintain the arc and form a cloud of gas through vaporization to keep air from the molten metal; they create a molten slag to purify the pool by floating out impurities, create a solidified slag to form an insulating blanket over the weld to promote annealing, and also provide a variety of alloys from a single core wire through addition of powdered alloys in the coating.

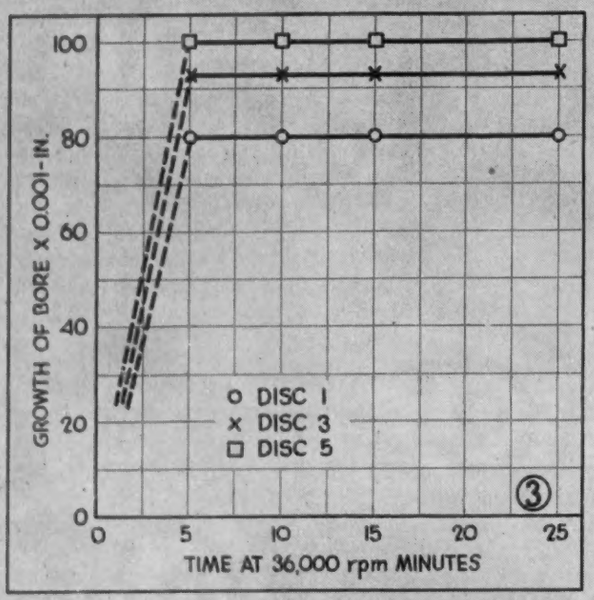
DISTORTION is practically eliminated, and a tougher core as well as a better and more uniform case result from the use of a dry cyaniding process on low carbon carburzing steel. According to Perfection Tool & Metal Treating Co., Chicago, developers of the process, case depths up to 0.025-in., of true carbon combined with nitrogen, with a hardness in excess of 60 rockwell C are obtained.

# Pre-Stressing

By HERBERT DOBKIN
Special Projects Dept.
M. W. Kellogg Co.
Jersey City, N. J.




MODERN gas turbine and jet propulsion engines operate under a variety of severe service conditions. Not only are the temperature conditions extreme, both as to maximum temperature and temperature gradients, but the operating speeds of some of the rotating parts are also very high.

Heart of these engines is forged turbine and compressor disks, which are generally fairly large, and which operate at extremely high speeds. Therefore, the centrifugal stresses in these rotating disks are very high, even during ordinary operating conditions, and a tremendous amount of kinetic energy is stored up in one of these large disks when rotating at high speeds. Consequently there is a possibility of severe damage and perhaps personal injury should one of them fail in service. This is particularly true of aircraft designs, where weight considerations keep the safety factors low.

In view of these facts, it was necessary to develop a "sure-fire" testing procedure which would make certain that the design, manufacture, and material of the disks were adequate to enable them to withstand the stresses to which they would be subjected in service. The method finally worked out for accomplishing this purpose is one in which the disks are oversped in a test stand before they are assembled in an engine, at a speed which is 10 to 20 per cent above the highest speed at which they will ever be required to operate in an engine. This overspeeding is carried on for 5 to 10 min, since, as will be discussed below, this time has been found to be sufficient.

Design of the test stands used for overspeeding is too detailed to be discussed within the length of this article. Briefly, however, the disks are rotated in an evacuated chamber by means of a high speed air turbine, the speed of which can be controlled quite accurately. Walls of the chamber are fabricated of heavy layers of

*Fig. 1—Curve depicting permanent growth in region of bore during overspeeding*

*Fig. 2—Hardness increase in region of bore of various disks during overspeeding*

*Fig. 3—Variation of growth with time in successive overspeeding operations*

# g Rotating Disks

*Rotating disks used in turbines and compressors, subjected to a 10 to 20 per cent overspeeding in test stands, receive permanent plastic deformation and high residual compressive strength*

wood, concrete, and armor plate, in order to protect the operator from flying pieces in case of failure of a disk during test. Disks which successfully withstand the overspeed test are considered satisfactory for assembly in an engine.

The method of overspeeding was decided upon since it was felt that overspeeding would not only segregate good from faulty disks, but would also pre-stress the disks, and thus enable them to withstand service conditions much more readily than otherwise. The idea that pre-stressing of the disks would occur was reasoned from the well known fact that centrifugal stresses in the test parts increase as the square of their operating speed, and thus the stress in the disks during a 10 to 20 per cent overspeed could actually be made to exceed the yield strength of the disk material. The result of stresses above the yield strength would be permanent plastic deformation and strain hardening, which would leave disks with a residual compressive strength when the overspeeding was stopped.

As will be described later, test results have actually shown this reasoning to be correct. Considerable permanent growth and increase in hardness has been noted in many disks after overspeeding, and they must often be remachined to size after this operation. In cases where large growths are expected, it is often necessary to start with an undersize disk, in order to eliminate the necessity of machining away too much of the strain hardened material after overspeeding. The plastic deformation of these disks is of such a magnitude that "stretcher" or "strain" marks are clearly visible on surfaces after overspeeding.

It has been found from tests that the residual compressive stresses due to overspeeding may be as much as 5000 to 10,000 psi. This means that the disk when operating in the engine, must overcome a compressive stress of 5000 to 10,000 psi, before it becomes subjected to the centrifugal tensile stresses due to rotation. Consequently, maximum actual operating stress is that much lower than the tensile stress which would ordinarily exist at the operating speed if disk had not been oversped. Advantages of such a pre-stress are obvious.

Many tests have been made to investigate the beneficial effects of overspeeding as described above, and

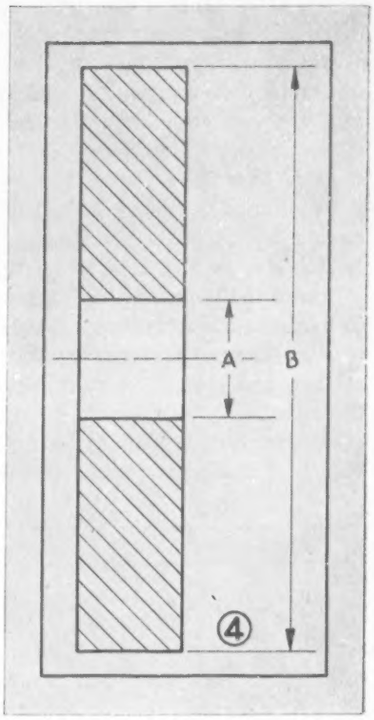



*Fig. 4—Sketch of cross-section of circular disks prior to overspeed experiments*

all verify the fact that overspeeding strain hardens and pre-stresses the material. Tests have been run on both steel and aluminum, but there seems to be no reason why the same results should not hold true for other materials.

As an example of the manner in which these tests are made, and the method by which conclusions were arrived at, the following data have been abstracted from a large number of tests on various parts. Data given here is hypothetical, as the purpose of this article is to give a general overall picture of the overspeeding operation rather than specific data on any particular type of material or design of disk. The fundamental principles which will be demonstrated are quite reliable; they are supported by a large amount of actual test data.

In the case of a forged disk diagrammatically shown in Fig. 4, designed to operate at approximately 24,000 rpm, overspeed tests are conducted as follows: A group of about five such disks are selected, and all are given a careful dimensional inspection and complete hardness check before testing. Hardness readings are taken at several points in the region of the bore, near the outer edge, and half way between the bore and the outer edge on both faces. Disks are then oversped for 5 min at each of the following speeds: 27,500 rpm, 30,000, 32,500, and 36,000 rpm. After each of these test conditions, the overspeeding is stopped, and complete dimensional and hardness checks are again made.

Table I shows typical results for this type of test, and indicates the manner in which these disks grow at rapidly increasing rates as the speed is raised above the value, which causes the stress in the disk to exceed the yield strength of the material of which it is made. As would be expected, the amount of growth is greatest in the region of the bore, and decreases out toward the edge

of the disk. This is due to the fact that the combined radial and tangential stress is greatest at the bore and least at outside edge; the material closest to the center of disk carries the load of all outside material. Fig. 1 shows graphically the manner in which bores of these disks tend to grow, and the rapidly increasing rates of growth at higher speeds.

In addition to the growth, hardness of the blanks increases rapidly with increasing speed as shown in Table I, and also in Fig. 2, wherein hardness increase in the region of the bore is plotted against speed. This increase in hardness indicates that strain hardening actually takes place, and that it occurs rapidly as the stress increases at first, and then at a much slower rate, or not at all, thereafter.

One important point to be noted from the curves of Fig. 1, is that as the speed (stress) is increased, a value is reached at which growth starts to take place exceedingly rapidly (in this case about 28,000 rpm) and that if the speed increase is continued, it would soon lead to failure. Even below the speed at which the disks would fail, the curve is so steep that only minor variations in material quality or in testing speed can cause appreciable differences in the absolute values of the growth of the various disks. However, Fig. 2 shows that strain hardening is practically complete at 28,000 rpm, and indicates that little or no additional advantage can be obtained from going to higher speeds.

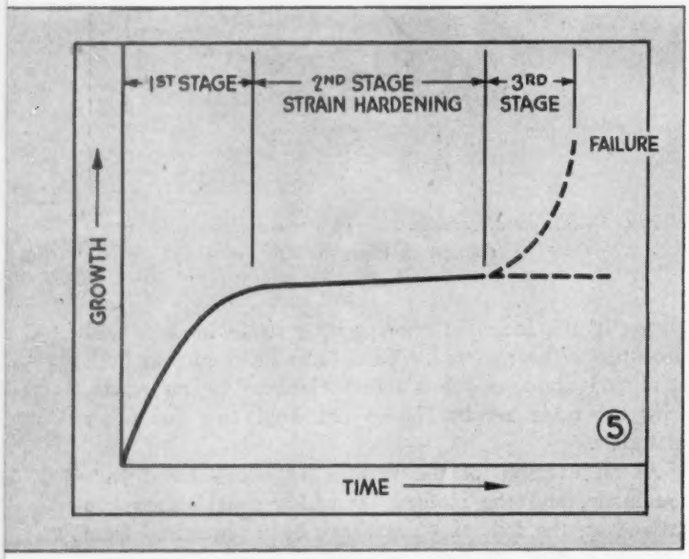



*Fig. 5—General manner of variation of growth with time for steady stress condition*

**TABLE I**

**RESULT OF OVERSPEEDING FIVE SIMILAR DISKS AT VARIOUS SPEEDS**

| Disk No. | Dimension | Growth After 5 Minutes At 27,500 rpm | 30,000 rpm | 32,500 rpm | 36,000 rpm |
|---|---|---|---|---|---|
| 1 | A | 0.003 | 0.009 | 0.031 | 0.085 |
| | B | 0.001 | 0.006 | 0.015 | 0.026 |
| 2 | A | 0.002 | 0.007 | 0.029 | 0.080 |
| | B | 0.001 | 0.004 | 0.013 | 0.021 |
| 3 | A | 0.002 | 0.011 | 0.035 | 0.093 |
| | B | 0.0005 | 0.007 | 0.017 | 0.026 |
| 4 | A | 0.003 | 0.010 | 0.033 | 0.089 |
| | B | 0.001 | 0.008 | 0.013 | 0.024 |
| 5 | A | 0.003 | 0.014 | 0.039 | 0.100 |
| | B | 0.001 | 0.007 | 0.016 | 0.029 |
| | | Average Increase in Brinell Hardness | | | |
| | Bore | 5 | 6 | 6 | 6 |
| 1 | Middle | 4 | 5 | 7 | 7 |
| | Edge | 4 | 4 | 6 | 6 |
| | Bore | 5 | 6 | 6 | 6 |
| 2 | Middle | 4 | 5 | 6 | 6 |
| | Edge | 5 | 5 | 5 | 5 |
| | Bore | 8 | 8 | 8 | 8 |
| 3 | Middle | 6 | 6 | 7 | 7 |
| | Edge | 6 | 6 | 6 | 6 |
| | Bore | 7 | 7 | 7 | 7 |
| 4 | Middle | 6 | 6 | 7 | 7 |
| | Edge | 4 | 4 | 5 | 5 |
| | Bore | 9 | 10 | 10 | 10 |
| 5 | Middle | 6 | 6 | 7 | 7 |
| | Edge | 6 | 6 | 6 | 6 |

Following the above tests, some of the disks, approximately 3 of the 5, are usually subjected to additional overspeeding at 36,000 rpm in order to further define their growth and strain hardening tendencies. They might each be given two more 5 min. overspeeds, and then a 10 min overspeed at 36,000 rpm, which would bring the total overspeed time at that speed to 25 min. After each of these test periods the overspeeding is also stopped, and disks are inspected dimensionally as before. As is shown in Table II, no further growth is ever noted for any of the blanks after this continued operation at 36,000 rpm. These results are also shown in Fig. 3, in which bore growth is plotted against time at speed. The curves of Fig. 3 show that the initial deformation completes itself in a very short time (about 5 min) and that once it is completed, regardless of its magnitude, strain hardening begins and the material no longer tends to stretch.

This discussion indicates what happens during overspeeding, and the fact that it produces beneficial changes in the disk material. The reasons for these changes are readily explainable by some of the fundamental theories of physical metallurgy.

The fact that the increased growth is accompanied by increased hardness indicates that the material strain hardens under the load in an attempt to counteract the slip which is taking place along its crystal planes. As is shown in Fig. 1, the strain hardening will continue to counteract the slip, therefore producing small rates of deformation until the load becomes so great and the rate of extension so rapid that the material can no longer strain harden as fast as it stretches and will therefore fail. For the disks here discussed, the load to cause failure seems to be slightly above 36,000 rpm. In fact, a sufficiently long period of time at 36,000 rpm, without stopping the disk in between, might very well cause failure to occur at that speed.

Any value of speed (stress) below that which causes the material to fail can be maintained for long periods

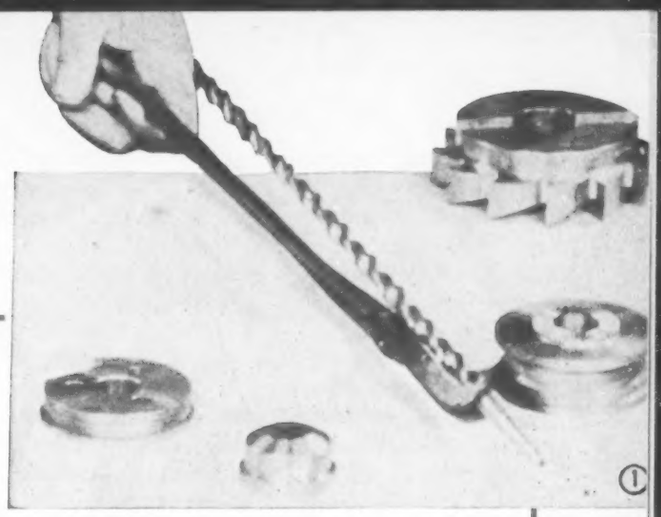
(*Please turn to Page* 150)

**TABLE II**

**EFFECT OF CONTINUED INTERMITTENT OVERSPEEDING AT 36,000 RPM**

| Disk No. | Dimension | Growth After 5 min at 36,000 rpm | 5 more min at 36,000 rpm | 5 more min at 36,000 rpm | 10 more min at 36,000 rpm |
|---|---|---|---|---|---|
| 2 | A | 0.080 | 0.080 | 0.0805 | 0.080 |
| | B | 0.021 | 0.022 | 0.021 | 0.021 |
| 3 | A | 0.093 | 0.093 | 0.093 | 0.093 |
| | B | 0.026 | 0.0255 | 0.026 | 0.026 |
| 5 | A | 0.100 | 0.100 | 0.0995 | 0.100 |
| | B | 0.029 | 0.0295 | 0.0295 | 0.029 |

By W. B. MACNERLAND
Lindberg Steel Treating Co.
Chicago



# HIGH-SPEED HARDENING WITHOUT ATMOSPHERES

*Easily assembled and procured materials adapt a conventional furnace for high-speed steel heat treating use*

TOOLS are being made to closer finished size to save time in grinding. Typical are these high speed cutters shown in Fig. 1. They are made to size and cannot be ground after heat treatment. Some plants are not required to do a high volume of high speed work, and therefore are not equipped with modern controlled atmosphere high speed furnaces. This however, doesn't stop the heat treater from turning out good high speed work. The use of inexpensive and simple equipment adapts a conventional open fire furnace so that tungsten and molybdenum high speeds can be satisfactorily handled.

Process consists simply of preheating the work at 700°-1000° F and immersing the tool in a molten boric acid bath which has the appearance of any normal salt bath. Prior to immersion the bath is of course heated to the conventional hardening temperature. It is important to remember that boric acid is used—and not borax. Care must be taken to prevent the boric acid from dripping inside the furnace as it will cause deterioration of the hearth.

Container used can be almost any shape. (See Fig. 2.) For continued service, container should be made of heat resisting alloy such as nichrome or 65 per cent nickel—15 per cent chromium types. Ribs on the outside bottom will facilitate even heating. It is important that ribs be spot welded on the inside bottom of the pot to keep the work entirely surrounded by the molten boric acid. The work might pit if allowed to lie flat on the bottom of the container. From time to time it is necessary to add boric acid to replace dragout.

Heating time for the circular form tool shown in Fig. 3 is 17 min. This is about triple the time called for with modern equipment. If the part is such that it cannot be handled with hook or tong, it can be wired for handling, but the wire must be nickel-chromium alloy or straight nickel, otherwise it will cause pitting of the work. The

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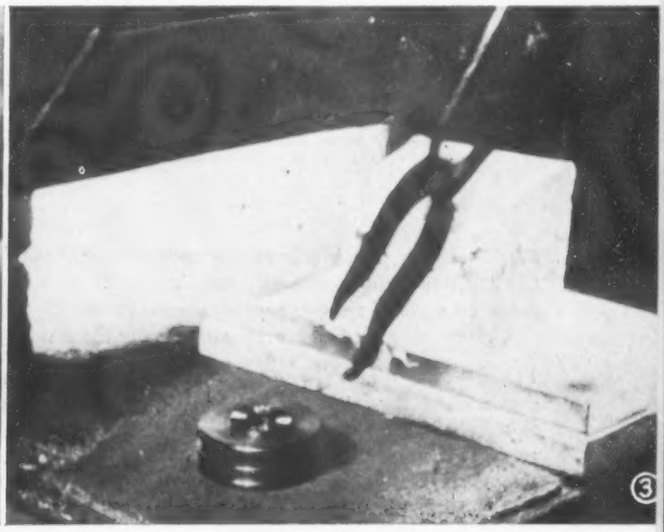


# Designing POWDER METAL Parts

***If the limitations of powder metal briquetting are understood, parts can be designed accordingly and full advantage taken of the savings this production method has to offer****

PRODUCTION of powdered metal parts is an exacting and painstaking process, based on long years of metallurgical research and production experience.

At Moraine Products Division, General Motors Corp., Dayton, O., countless mixes have been developed and tested in the search for the most effective combinations of ingredients; much laboratory work has been applied to the problems of density, briquetting methods, sintering temperatures, duration of sintering, atmosphere control and the other factors that determine the physical properties and usefulness of metal powder parts. Also, to meet the problem of production of varied types of parts and using a wide range of materials and processes, engineers approach the design of new parts with a broad and practical viewpoint.

Like all other metallurgical and industrial processes, powder metallurgy was developed to meet a demand. It has been applied to the fabrication of: (1) High-melting-point metals, such as tungsten, molybdenum, tantalum, etc., for lamp filaments, etc.; (2) alloys which retain the individual characteristics of the constituent metals, required for electrical contacts and electrodes; (3) metal and non-metal combinations, such as diamond-impregnated grinding wheels and carbon graphite brushes; (4) cemented carbide cutting tools; (5) parts which utilize the unusual physical structure of metal powder products, best illustrated by self-lubricating bearings and porous metal filters.

Two phases of powder metallurgy which have received considerable attention at Moraine Products are: Fabrication of iron and bronze parts which possess inherent characteristics not otherwise obtainable; fabrication of parts which can be produced faster, better, more economically by powder metallurgy because of the reduction or elimination of secondary operations.

In the first category, represented by bushings and bearings, the designer is chiefly interested in the porous structure that permits self lubrication.

In the second category, which includes structural and functional parts, the designer is interested in the shapes obtainable by powder metallurgy methods. Many intricate

*This article is based on an abstract from Durex Engineering Manual, published and copyrighted by Moraine Products Division, General Motors Corp.

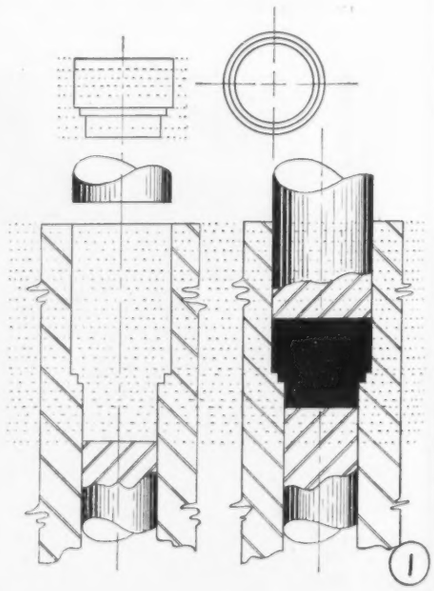


*Fig. 1—Upper punch (right) descends 10 units, and bottom punch travels up 4 units Compression ratio of over-all dimension is 22 to 8, which is satisfactory. In traveling down 10 units, the upper punch compresses the 15 unit "fill" over the first flange to 5 units (3 to 1), and the 16 unit fill over the second flange to 6 units (2.7 to 1)*

*Fig. 2—(Left) Die cell at time of fill, (right) cell at end of briquetting stroke for a part requiring two briquetting movements. Flanged portion of die cell is constructed to accommodate 3 unit-lengths of powder to form the flange, while the body cell is built to accommodate 9 additional unit-lengths. Upper punch descends 2 units to compress flange, and the bottom punch travels up 6 units to compress the body under flange and the desired 3 to 1 compression is thus effected*

shapes, requiring costly secondary operations to produce by conventional methods, can be produced rapidly and satisfactorily by powder metallurgy because they adhere to certain fundamental rules of design. Other shapes, much simpler, cannot be produced economically by powder metallurgy because they depart from these rules.

Ordinarily, the problems and methods involved in the production of a part or a material are strictly the producer's headache. The user does not care much about how the given results are obtained, so long as the finished part meets his requirements.

This cannot be the case where powder metallurgy is concerned. It is highly advantageous for the designer to have an over-all comprehension of metal powder processes; and it is essential for him to understand in detail the problems and methods of compacting, or briquetting, the powders. For briquetting is the "key operation" in powder metallurgy, determining what shapes are feasible and to what extent optimum physical characteristics can be obtained.

While practically all metals lend themselves to powder metallurgy, and have been used for various requirements, the most important raw materials in this company's field of commercial parts are iron, copper and tin powders, from which Durex iron and Durex bronze are produced. Powders of brass, and alloys possessing desirable magnetic qualities or hardening characteristics, are perhaps next in importance. In addition to these basic materials, small quantities of certain processing powders are sometimes included in the mix to facilitate ejection of the compacted part from the die, to serve as a lubricant or anti-galling agent in the finished part, to increase sintered hardness through carburization, or to accomplish any combination of these objectives.

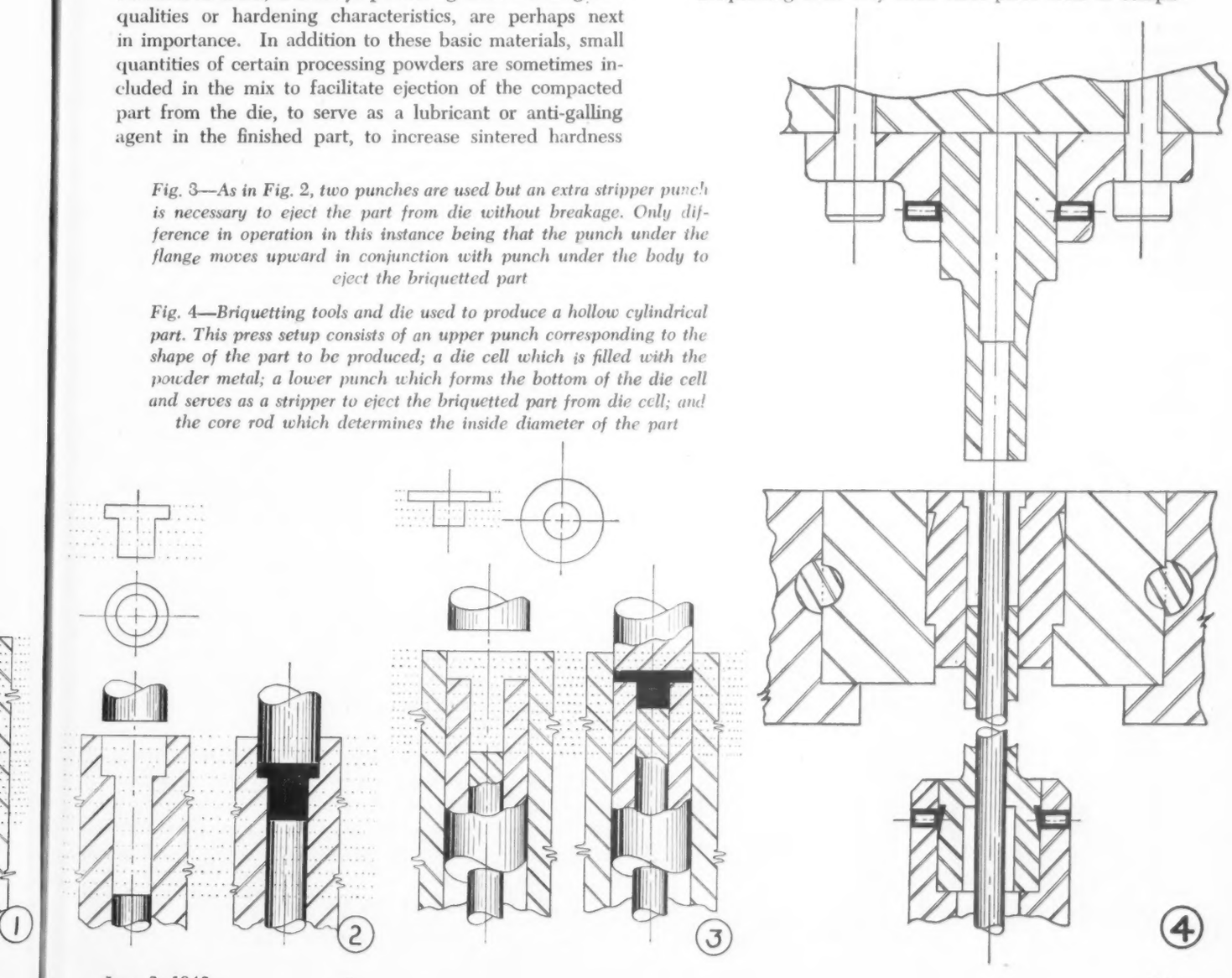
These powders have the appearance and "feel" of dust, and are fine enough to pass through a 100-mesh screen, on the average. Because any deviation in quality affects the properties and characteristics of the finished products, powders are selected with great care, on the basis of purity and consistency. This high standard of uniformity is maintained by storing the powders scientifically and blending them with laboratory precision. Since the presence of moisture causes particle adherence, resulting in a non-uniform product, powders are stored, mixed and briquetted in humidity-controlled rooms.

After being mixed to accurate proportions in special mixing machines, the powders are conveyed to the briquetting machines for fabrication into "green" briquettes. Presses used in briquetting are either mechanical or hydraulic, the former being preferable for mass production. The simplest type is that used in pharmaceutical tablet making, while more complicated presses involve many cams and motions to obtain the desired results. Capacities range from a few tons to thousands of tons, as determined by the sectional area of the part and the unit pressure required. This may vary from 15,000 to 100,000 psi.

Briquetting tools vary from three-piece tools to compli-

*Fig. 3—As in Fig. 2, two punches are used but an extra stripper punch is necessary to eject the part from die without breakage. Only difference in operation in this instance being that the punch under the flange moves upward in conjunction with punch under the body to eject the briquetted part*

*Fig. 4—Briquetting tools and die used to produce a hollow cylindrical part. This press setup consists of an upper punch corresponding to the shape of the part to be produced; a die cell which is filled with the powder metal; a lower punch which forms the bottom of the die cell and serves as a stripper to eject the briquetted part from die cell; and the core rod which determines the inside diameter of the part*



cated die sets. Without going into detail, the briquetting process can be illustrated by describing the operation required to produce a simple hollow cylindrical part, such as a sleeve bushing (Fig. 4). Press setup consists of: (1) Die cell filled volumetrically by a hopper in most cases; (2) an upper punch—in this case, hollow, corresponding to the shape of the bushing to be produced; (3) a lower punch, also hollow, which forms the bottom of the die cell and serves as a stripper to eject the briquetted part from the die cell; and (4) the core rod, either movable or stationary, which determines the inside diameter of the bushing.

Briquetting die tools are of high quality tool steel, machined to a close tolerance, and hardened, ground and lapped to a mirror finish. The fit of the upper and lower punches in the die cell must be extremely accurate, since too loose a fit would produce flash burrs and too tight a fit would compress air in the compact, or cause the punch to freeze. A slight taper is designed in the upper part of the die cell to facilitate ejection of the briquetted part and to allow for escape of air in the early part of the stroke.

Compression ratio is roughly 3 to 1 with iron and bronze powders, although the actual figure for each part must be determined very accurately in the laboratory before it goes into production. Because densities will vary under the same unit pressure, according to the length of the piece, its shape and wall thickness, it is often necessary to go to more complicated die sets: The upper punch may involve two or more punches moving independently; the lower punch may be used to apply pressure as well as to eject the part. Die inserts which move relative to the punches are often required to insure correct fill on parts that involve separate and distinct levels.

After the part has been compressed and ejected from the die cell, it is in the form of a green compact. To all appearances, it resembles the finished part; yet its only strength is derived from the interlocking irregularly shaped particles resulting from compression. Parts are not so fragile, however, as to require more than ordinary care in handling and stacking on trays for sintering. While the green compact is almost identical in shape to the finished part, allowances have been made in dimensions for the shrinkage or expansion that will take place during sintering. This depends on the character of the powder, the composition of the mixture, the density to which the part was briquetted, and the manner of sintering. Effect of these variables must be determined accurately by laboratory experiments before production tools are designed.

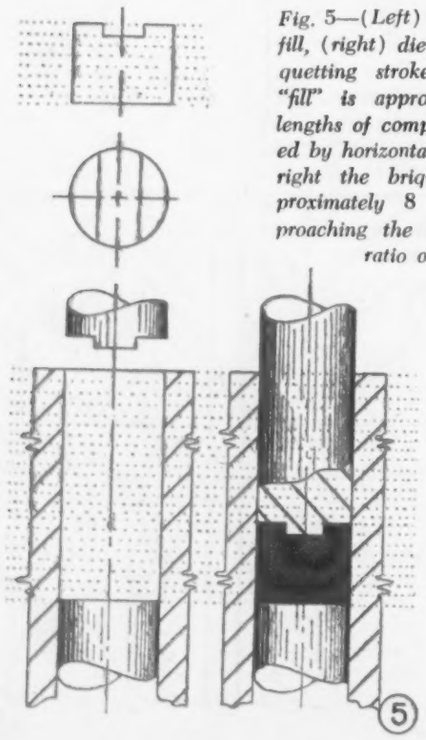



*Fig. 5—(Left) Die cell at time of fill, (right) die cell at end of briquetting stroke. At left powder "fill" is approximately 23 unit-lengths of compression (represented by horizontal lines) whereas at right the briquett occupies approximately 8 "units" thus approaching the ideal compressions ratio of 3 to 1*

Trays containing the green compacts are passed through an atmosphere-temperature-controlled furnace to bond the particles together and to provide the desired strength. Sintering temperature and sintering time depend on the type of material used and the final properties desired. They must be maintained very accurately to attain uniform shrinkage or expansion and consistent physical characteristics. Sintering temperature is well below the melting point of the major constituent: In the case of copper-tin alloys, the tin melts before the sintering temperature of copper is reached; while in the case of plain iron powders there is no molten constituent at any time.

Although there is some application for batch-type furnaces, most furnaces are the continuous-conveyor type. Trays of briquetted parts move through a heating zone, a soaking zone and finally a cooling zone to cool parts to a temperature at which oxidation will not occur. Atmospheres must be varied to suit the particular requirements of the material, with the double objective of preventing the formation of surface films, such as oxides, and reducing any oxides which may have been present in the powders before mixing and briquetting.

When Durex parts come out of the sintering furnace, they possess sound physical properties, excellent surface finish and dimensional tolerances sufficiently close for many applications. This is especially true of Durex iron parts, which can be held in most cases to plus or minus 0.002-in. per in. perpendicular to the axis of briquetting.

If very close tolerances are required, or if it is desirable to obtain higher physical properties, parts are "sized" by a coining operation on a conventional press. By this operation both iron and bronze parts are held to a tolerance of plus or minus 0.0005-in. per in., perpendicular to the axis of briquetting. Strength is increased through the increase of density of the part, and an exceptionally smooth-surface finish is obtained.

Machining is resorted to as a finishing operation where extremely close tolerances are required; or as a supplementary operation where the required shape can be obtained only partially by powder metallurgy. Even though these operations cannot always be totally eliminated, they often can be reduced to the extent that a saving is effected over what the part would cost if produced by conventional methods.

Machinability of both Durex iron and Durex bronze parts is fair. The bearing surface is usually not machined, because this tends to close the pores. When machining is required on other areas, this should be done without the use of a coolant, since the absorption of this liquid will interfere with impregnation.

Special problems in plating metal powder parts are im-

(*Please turn to Page* 156)

# Diamonds As cutting tools

## And Some of Their Possibilities

*Despite tremendous strides in development of man-made materials of extreme hardness, the fact remains that without a constant supply of natural "gems in working clothes", industry would be unable to carry on many of its most vital operations*

By J. R. ROUBIK
and
J. P. BUNCE
Kearney & Trecker Corp.
Milwaukee

ALTHOUGH diamonds usually are thought of as gems for personal adornment, about 75 per cent of the entire diamond output actually is utilized in industry. Of this 75 per cent, a considerable amount is diamond dust used for shaping and polishing and in the manufacture of diamond impregnated wheels for grinding carbide tools and other extremely hard materials. Whole stones of proper size, shape and quality are made use of for wire drawing, core drilling, and for forming and truing of abrasive wheels.

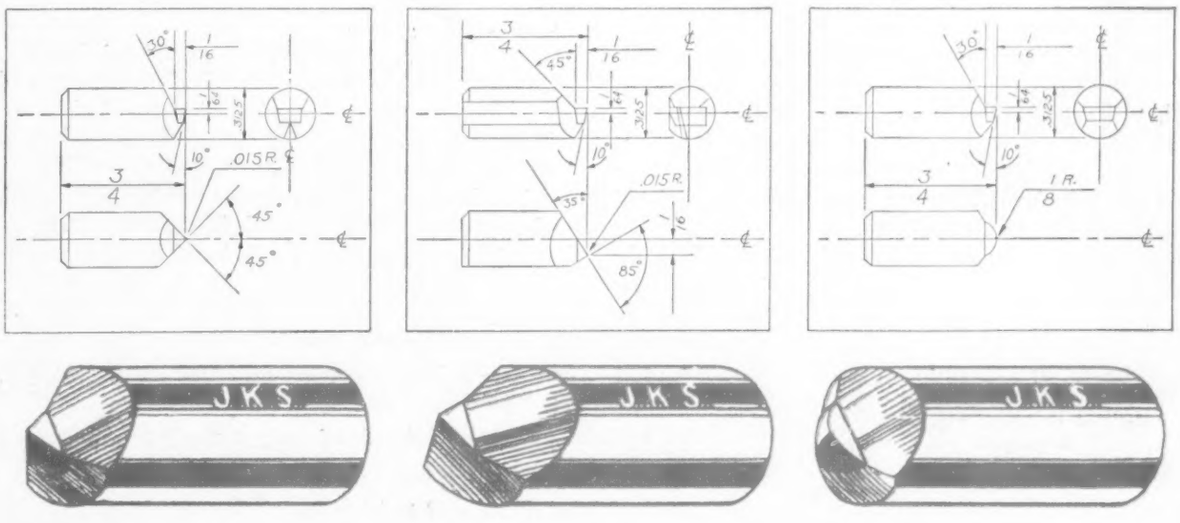
Diamond forming and dressing of wheels for precision thread grinding is an important application. The stones also are used as wear-resisting gage points, particularly when gaging moving work. Approximately 5 per cent of the total diamond production finds its way into such machining operations as boring, turning and milling. One of these days the story may be told as to what extent industrial crippling of the Axis countries was accomplished through rigid control of diamonds by the United Nations—Great Britain in particular.

Diamond tools are employed for machining paper calendaring rolls, hard rubber, fiber, celluloid, soft and light metals, synthetic resin plastics, porcelain, natural and artificial stone, and in some cases, even hardened steel. References have been found which indicate industrial use of diamond cutting tools as far back as the time of the American Revolution. However, their use in machine shops did not become common until after 1920, at best not as tools for machining purposes.

Industrial diamonds are grouped into three categories. Carbons, also known as black diamonds or carbonados, are amorphous, granular stones. They are dark purple-brown in color, and only rarely do they have any traceable crystallization or cleavage planes. Ballas diamonds, like the carbons or black diamonds just mentioned, are found principally in Brazil. They form an intermediate class between carbons and bort. Bort (or "bortz"), found both in Africa and Brazil, is entirely crystalline, having distinct cleavage planes. Bort stones may be of almost any color, although the two extremes—those of clear, transparent type

(*Please turn to Page* 154)

*Here are three typical examples of formed diamond-pointed cutting tool bits suitable for use either on turning or boring jobs calling for extremely fine finishes. The stones specified for these tools in each case are highest grade Brazilian or African bortz. Rough weight, prior to lapping to shape, will be about 1 carat (3.2 grains). Designs are by J. K. Smit & Sons Inc., New York and Detroit*



# WELDED PEDESTAL

*. . . . for large electric motors are light, strong and of good appearance. Bearings redesigned for pedestals utilize a 1:1 ratio of length to diameter*

CHANGING from previously used types to welded type pedestal bearings for large electric motors permits lighter weight with no sacrifice in strength, performance, or appearance. Also, fabricated steel construction is faster, and better control of the material source is achieved. Through the use of special welding equipment, cost of welded fabrication is said to be comparable with former methods of construction.

Fig. 4 shows the cast construction for pedestal bearing support. The wide spread feet provide volume enough to insure large oil reservoir for ample cooling, and baffles built within the pedestal direct the oil flow to gain cool operation.

Oil capacity and flow direction advantages were retained in the welded pedestal shown in Figs. 6 and 7. In Fig. 5, plates forming sides of the pedestal are fitted at right angles so that the joint forms a 90° V, and the corner is welded to the full thickness of the plate to assure a strong, oil tight joint. The bearing sleeve rests on two supports, with the oil ring running between the supports. These supports are visible in pictures showing the bearings, and method of inserting them in pedestal is readily apparent in Figs. 3 and 5.

Figs. 1, 3 and 5, show steps in construction of the pedestal. Figs. 3 and 5 illustrate the partially completed pedestal in place on the motor driven positioner which is adjustable in azimuth and elevation. In the lower left is seen the reversible motor control by which the operator may set the fixture in any position necessary to facilitate welding. Larger positioners are used for heavier pedestals, but are hand driven as the volume of production is less.

In Fig. 1, the bearing cap is ready for welding, after which burr grinding will smooth rough edges. Completed pedestal and cap are shown in Fig. 6.

Heat dissipation by conduction and radiation from the steel is comparable to that of cast iron, and adequate heat transfer is assured by use of ample reservoir capacity. The cross section of the welded pedestal (Fig.7) shows the principle of oil circulation in which the warm oil from the end of the bearing sleeve flows down along the sides of the pedestal housing and is cooled before circulating upward to be picked up by the oil ring.

### 1 To 1 Ratio Bearings

Because of the shaft deflection which can occur within the length of a long sleeve bearing, areas at ends of the bearing—particularly outboard—may be subjected to high bearing pressure. Support deflection or shaft misalignment in assembly also may cause shaft load to be concentrated in a small area or band at the outer edge of the bearing, resulting in a lack of full utilization of the remainder of the bearing. Because of such ineffective use of the bearing area of long bearings, half of the length can be omitted to get a 1 to 1 ratio bearing. Fig. 4 shows the constuction with a 2 to 1 ratio bearing, in which the length is twice the diameter. Fig. 2 shows the newer short bearings. As the projected area of the 1 to 1 bearing is only one half of the former value, the pressure per square inch will increase somewhat, but will be limited to less than 200 psi by limitations on shaft stresses, belt tension, and other considerations.

Pressure used in design is about 160 psi depending on speed of the unit, oil used, etc. Higher pressure could be used in many cases without breaking the oil film. Savings in bearing size permit use of harder material to permit still greater margin of safety in design.

The bearing has two supports within the pedestal, employing the welded pedestal fabrication. Only one oil ring is used on the 1 to 1 ratio bearing, rather than two as

By E. W. SJOQUIST
*Chief Mechanical Engineer*
Electrical Machinery Mfg. Co.
Minneapolis

*Fig. 1—Fabricated pedestal near completion*

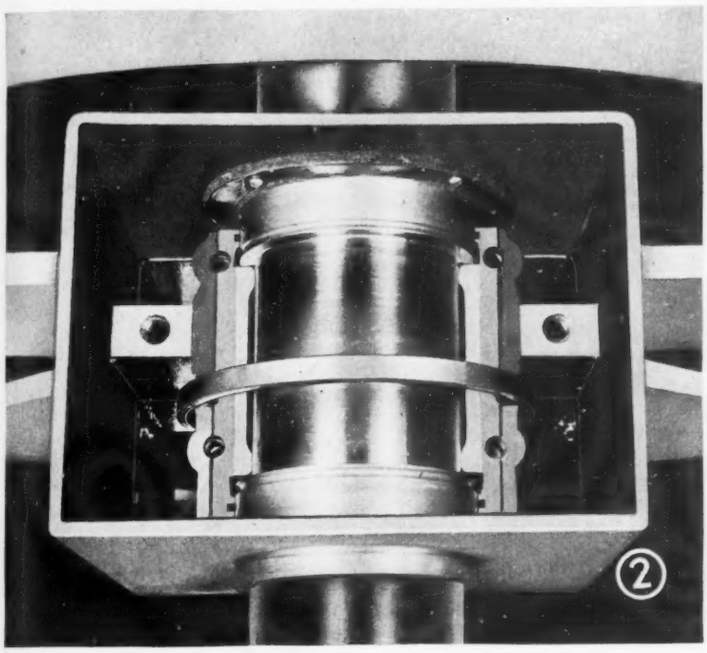
*Fig. 2—The 1 to 1 ratio bearing designed with high brinell babbitt. Baffles for directed oil circulation can be seen*

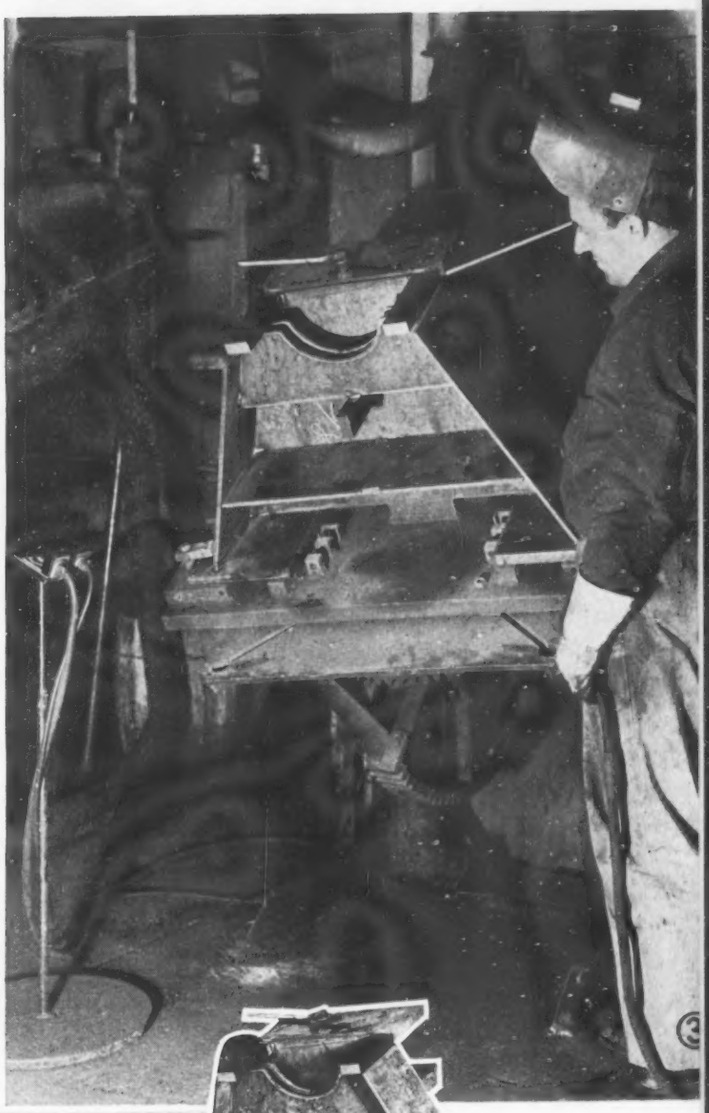
*Fig. 3—Fabrication of welded pedestal using jigging fixture shown in Fig. 5*

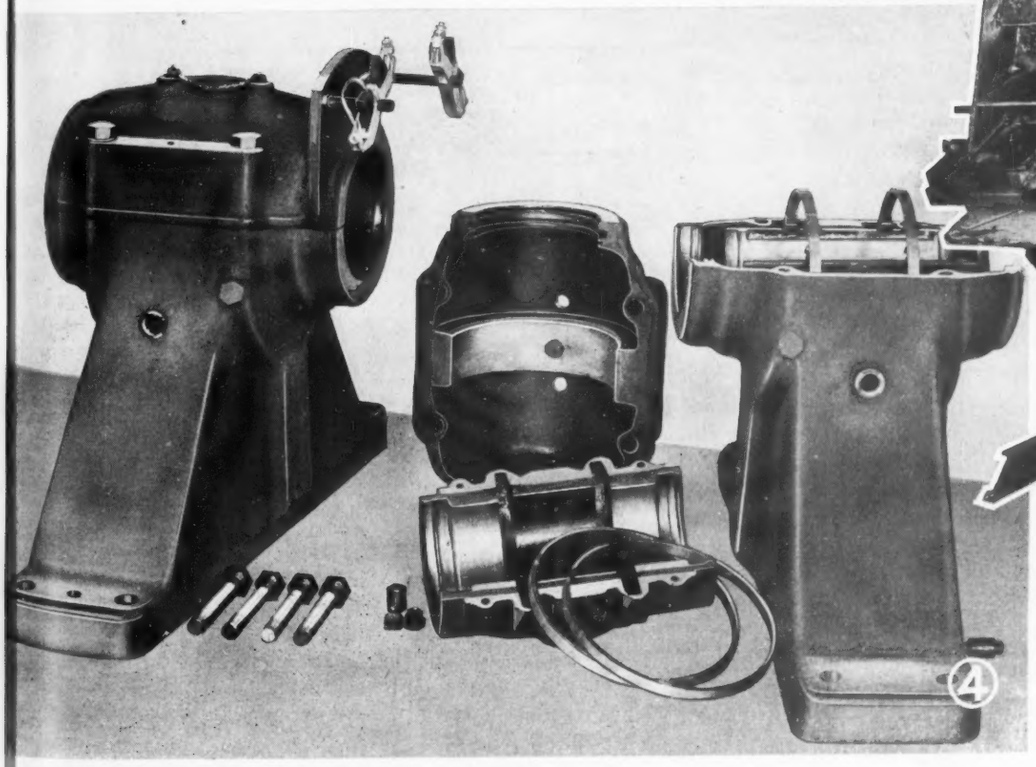
*Fig. 4—Cast pedestal construction with 2 to 1 ratio bearing*

*Fig. 5—Jigging fixture used in fabrication of pedestal*

# BEARINGS



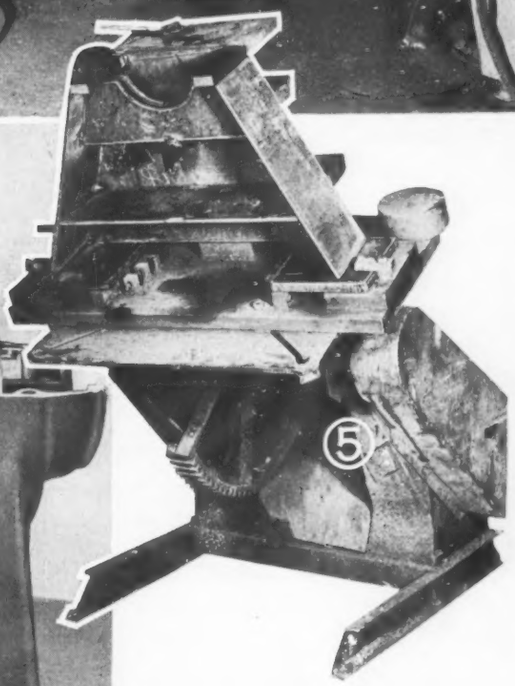



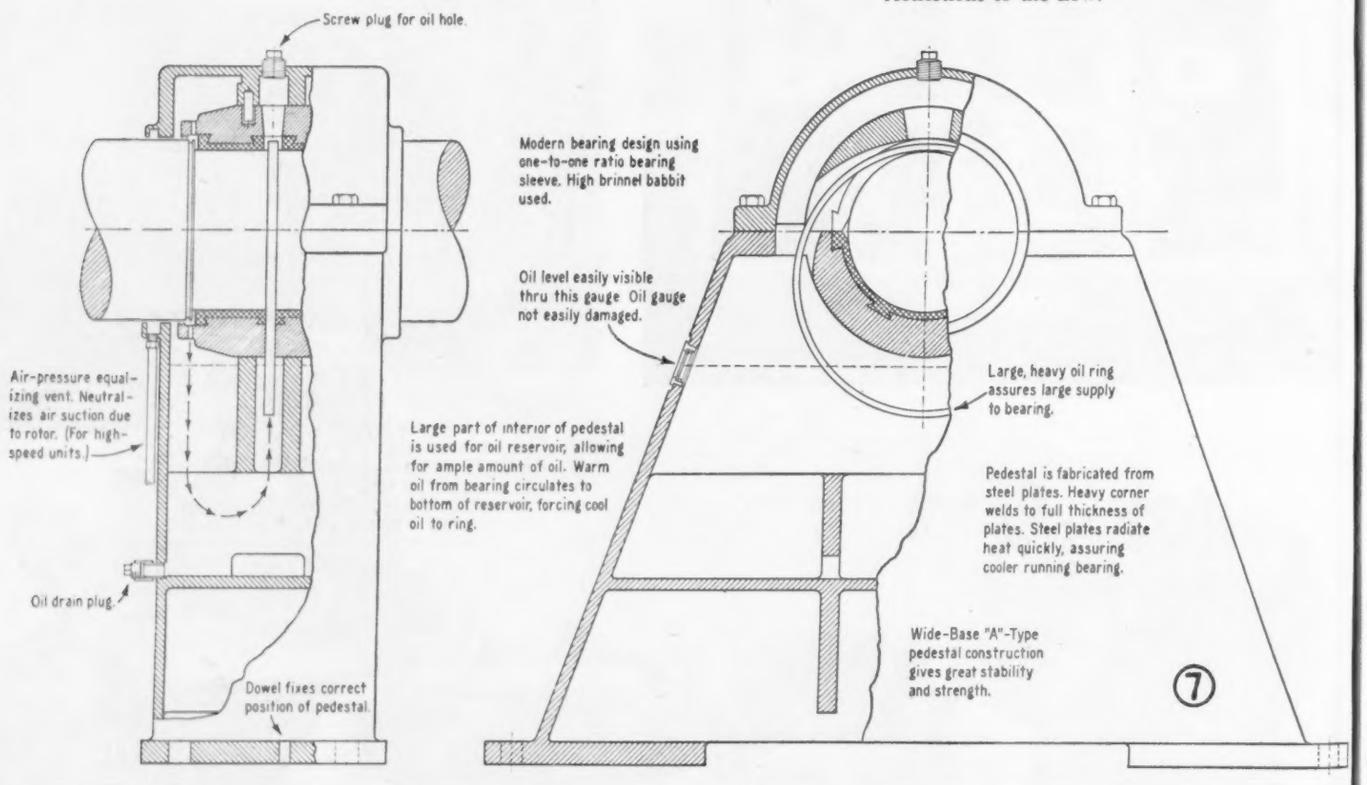
*Fig. 6—Welded, steel plate construction, in the wide-base, "A" shape for stability. Oil reservoir is large for adequate cooling, and oil level is readily visible through gage on side of pedestal*

*Fig. 7—Cross-section of welded, pedestal type bearing. Several features of construction are indicated*

formerly. This single ring is larger and heavier than formerly and supplies an ample quantity of oil to the bearing.

Sleeve bearing tests made under various conditions of load show that reliability and wearing qualities of the 1 to 1 ratio bearing are equal to that of the longer bearing, and in some cases are greater. The higher average unit pressure of the 1 to 1 bearing effects a decrease in the coefficient of friction, resulting in less friction loss and a cooler running bearing. Less running-in time is needed on these shorter bearings. The pressure is distributed more uniformly and high pressure areas no longer exist. High pressure areas formerly resulted in overheating, local wiping, and the need for occasional scraping.

The shorter bearing will stand as much belt tension as a longer bearing of the same diameter, and will effect a decrease in housing size which in turn will permit an increase of ventilating air into the machine because of reduced restrictions to the flow.


Screw plug for oil hole.
Modern bearing design using one-to-one ratio bearing sleeve. High brinnel babbit used.
Oil level easily visible thru this gauge. Oil gauge not easily damaged.
Air-pressure equalizing vent. Neutralizes air suction due to rotor. (For high-speed units.)
Large part of interior of pedestal is used for oil reservoir, allowing for ample amount of oil. Warm oil from bearing circulates to bottom of reservoir, forcing cool oil to ring.
Large, heavy oil ring assures large supply to bearing.
Pedestal is fabricated from steel plates. Heavy corner welds to full thickness of plates. Steel plates radiate heat quickly, assuring cooler running bearing.
Oil drain plug.
Dowel fixes correct position of pedestal.
Wide-Base "A"-Type pedestal construction gives great stability and strength.
7

## Metal & Thermit Offer New Bronze Electrodes

Aluminum bronze and phosphor bronze electrodes that make available a wide range of alloy deposits varying in chemical analyses and in mechanical properties are offered by Metal & Thermit Corp., New York. Electrodes range from high tensile strength and ductility with comparatively low hardness to medium strength with zero ductility and relatively high hardness. All have good wearing and bearing characteristics and excellent corrosion resistance, it is claimed.

Aluminum bronze electrodes are manufactured in four types with brinell hardness varying from 120 to 300, which, it is stated, qualifies each one for a specific use. The one phosphor bronze electrode has a brinell hardness of 71. It is said to produce sound, homogeneous welds with tensile strengths of 30,000 psi or more, depending upon base metal being welded. It may be used in all positions for high-speed welding of bronze, brass, copper steel and cast and malleable iron, the manufacturer reports.

—o—

"Memorable Events of 150 years in the History of our Nation, 1795-1945" is title of a 48 page pamphlet being offered by Wm. & Harvey Rowland Inc., Philadelphia. Containing an informative story on economic development of our country, the book was prepared for the sesquicentennial celebration of the Rowland organization, manufacturers of leaf springs.

LET LACQUER DO IT! LET LACQUER DO IT! LET LACQUER DO IT!

# Improving HIGH SPEED STEELS

***Easily assembled and procured materials adapt a conventional furnace for high-speed steel heat treating use***

MAJOR improvement in quality of high-speed steels, achieved by more even distribution of free carbides throughout the steel, and elimination of their segregation in the center is announced by Latrobe Electric Steel Co., Latrobe, Pa., under the name of the Desegatizing process.

Process was developed by Latrobe after considerable research. Purpose of the undertaking was to overcome segregation of a certain amount of free carbides in a brittle mass near the center of high speed steel bars and other shapes. This central grouping represented a non-uniformity and hence a source of weakness, the Latrobe company reports.

Metallurgists had always considered that an even distribution of the carbides, which create cutting and wear-resistant qualities, would produce the ultimate in tool steel quality. Yet the problem remained unsolved, and a certain amount of segragation came to be accepted as unavoidable.

The Latrobe process is said to represent the greatest step yet taken toward the ideal of even distribution of the carbides, which it achieves in a practical sense, and opens new prospects for high-speed steel quality.

Elimination of segregation produces steel bars of high uniformity. From this characteristic stems the superior performance of broaches, milling cutters, hobbs and the like, since strains set up have no main center of non-uniformity or weakness to seek. Uniformity of each tool adds to its sturdiness in shop use, permitting longer runs between grinds, more dependable and longer tool life, reducing warpage and breakage during use.

Photomicrographs, Fig. 1—magnified five hundred times—show central structure of a standard, and of a Desegatized steel bar. Hardened disks were used since true segregation is more apparent after hardening than in the annealed condition. Here, the segregation is apparent. Fig. 2 represents unretouched actual size views showing the structure of hardened disks cut from two bars of high speed steel. Here also, the segregation contrast is evident.

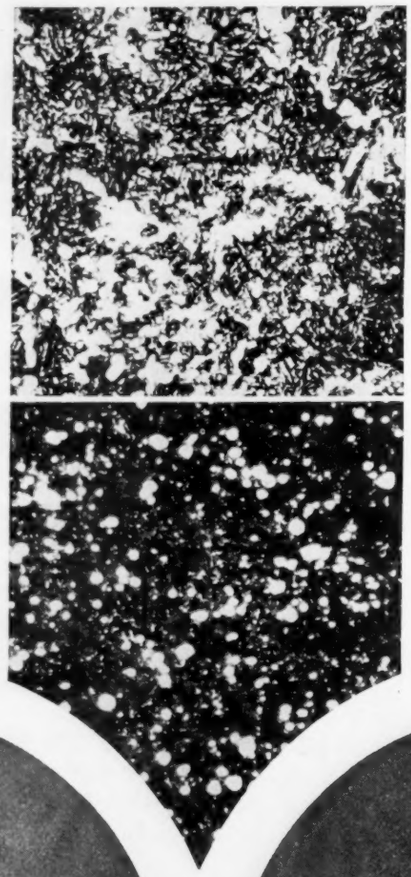


*Fig. 1 (right) — Top, photomicrograph showing center of a standard bar, 4 in. round, 18-4-1 type, Latrobe Electrite No. 1. Bottom, center of an average bar of Desegatized high speed steel, same size and type as at top. Both hardened, polished and etched*

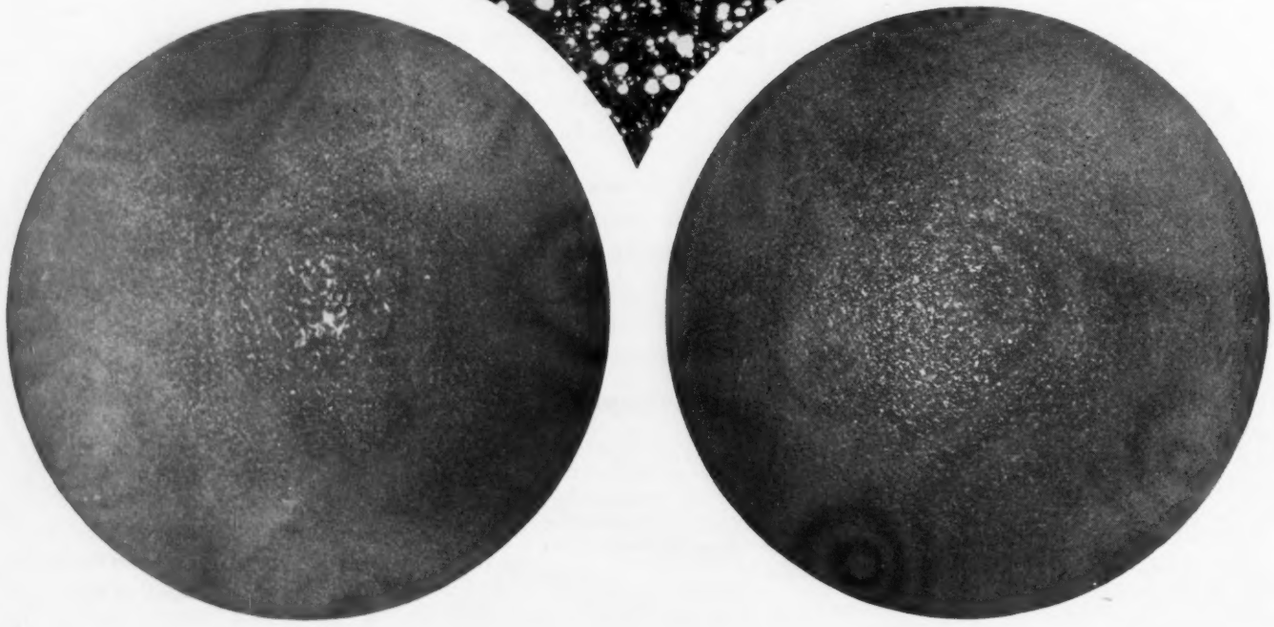
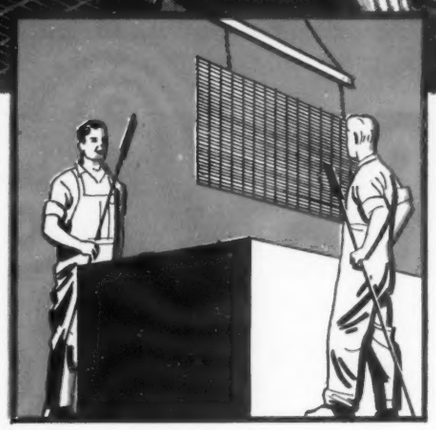


*Fig. 2 (below)—Unretouched photos showing structure of hardened disks cut from two bars of high speed steel. At left is standard bar, right, Desegatized sample. Same bar and type steel shown in Fig. 1*



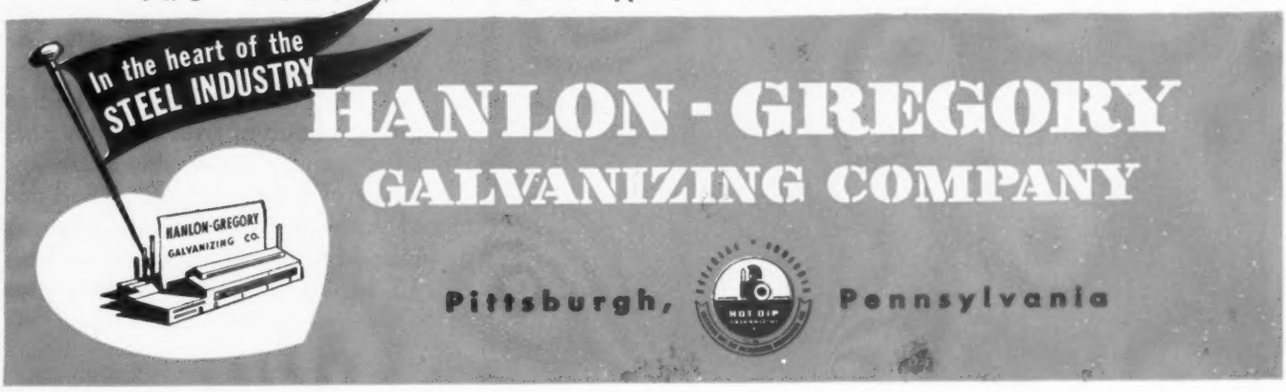
# Hot Dip Galvanized
# Open Steel Flooring
## *Lasts Longest*

**OPEN STEEL FLOORING** and grating installations *will* render greater uninterrupted service when protected against rust by the Hanlon-Gregory method of Hot-Dip Galvanizing . . . An investment that pays dividends in savings from expensive replacement and maintenance costs.

The World's Largest Hot-Dip Job Galvanizing Plant *can* increase the life and service of your iron and steel products, whatever they may be, with the *best possible* and *most economical coating* of *protective zinc* . . . Quantities of any size—from truckload to carloads.

*and Fastest*

THE WORLD'S LARGEST JOB GALVANIZING PLANT



# *Giant* GENERATOR SHAFT

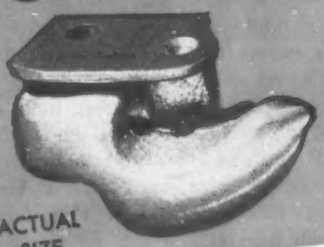
This rough forging weighing 75,000 lb will be part of 100,000 kw turbine generator under construction at the Schenectady Works of General Electric Co. It is designed for inlet conditions of 1250 psi and 1000°F at 3600 rpm. Built for Public Service Electric & Gas Co. of New Jersey, it is said to be one of the largest 3600-rpm machines ever constructed. It is rated 95,000 kw normal, 0.85 power factor and 0.85 short-circuit ratio at 15 psi hydrogen pressure, according to the company

TRUCK LOADER: Designed to lift, carry, stack and tier loads weighing up to 1000 lb, the light Trucloader, manufactured by Clark Tructractor, Battle Creek, Mich., is shown unloading a semi-trailer. Its compact size and 57 in. turning radius enable it to maneuver in narrow aisles, through doors, and in car and truck bodies

EXPLOSIVE RIVET SPEEDS PRODUCTION: This operator is setting explosive rivets in a bus body with an electrically heated riveting iron, both of which were developd by E. I. du Pont de Nemours & Co., Wilmington, Del. Rivets are fired in 1½ to 2½ sec by heat transmitted through head of rivet to a tiny noncorrosive explosive charge in the cavity of the rivet body. Blind end of shank is expanded into a barrel-shaped head, with a diameter from 15 to 30 per cent greater than original shank

# 68 TONS or..

## 2 OUNCES



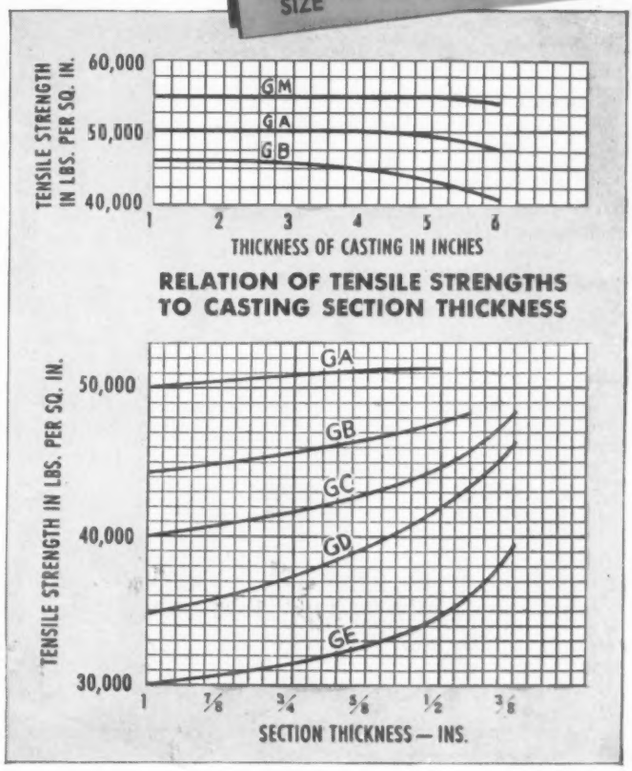
ACTUAL SIZE

# MEEHANITE ASSURES BETTER PROPERTIES!

The 68-ton Meehanite Casting illustrated forms the bed of a stone crusher capable of reducing large pieces of rock to crushed stone. Meehanite was selected because it provides the required high strength and wear resistance. Since the casting was machined at the quarry easy machinability was required.

In the small 2-ounce shuttle part, Meehanite manufacturing techniques provide the metallurgical control of structure and the "know how" in the other elements of foundry practice necessary to produce this casting in quantity and with the required characteristics.

Write for our new four-page bulletin "Meehanite Quality Control Assures Uniform Dependability."




# MEEHANITE

**Pershing Square Building, New Rochelle, N. Y.**

# *Electro-Hydraulic* BRAKE CONTROL

*Cushions stop without undue load swinging*

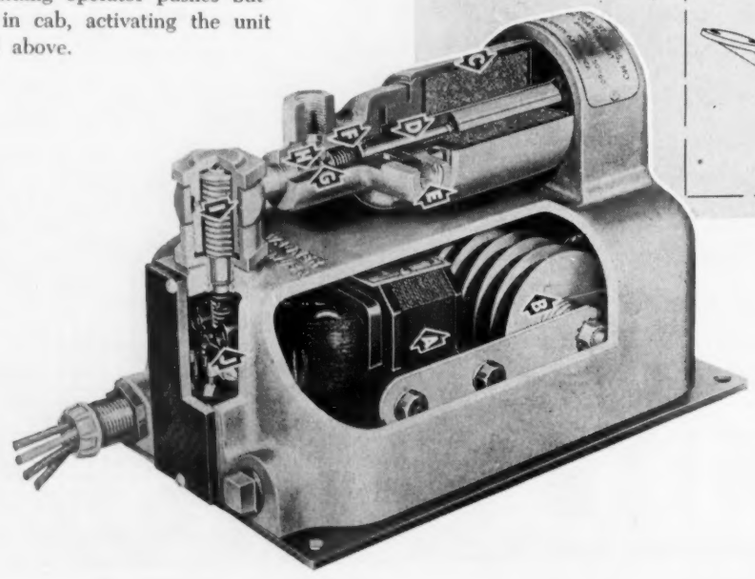
A DEVICE designed to bring a crane bridge to a cushioned stop automatically without undue swinging of suspended load in event of power failure, or when crane runs beyond safe limits, is the latest development incorporated on its type HM crane-bridge brake by Wagner Electric Corp., St. Louis. It is said to permit free use of the foot-controlled hydraulic brake for service stops, at the same time holding the parking-brake setting spring compressed and ready to apply the brake in an emergency.

Operation of the unit is shown by the cut-away picture shown in Fig. 1. It has a transformer A and a selenium rectifier cell B which converts alternating line current into 12 v direct current for operating the unit's valve. Resistors replace transformer and rectifier when line current is direct.

In operation electromagnet C is energized, holding plunger D against sealing cup F escape port. When operator uses brake for service stops, fluid enters port E and goes directly to brake actuating cylinder opposite port E (hidden from view). Limit switch or power failure opens line circuit K, de-energizing magnet C, releasing plunger D and permitting escape of fluid from hydraulic releasing cylinder mounted on crane brake. Fluid passes metering disk G which meters escape of fluid to allow brake to set at a predetermined rate.

In releasing parking brake, fluid entering port E passes through sealing cup F and out lower port to hydraulic releasing cylinder to compress brake setting spring. Fluid is also forced through tube H and acts on plunger I to close switch J, energizing magnet C, thereby trapping fluid in releasing cylinder and holding brake-setting spring compressed.

A diagram of the complete braking system is shown in Fig. 2. To apply brake for parking operator pushes button located in cab, activating the unit as described above.



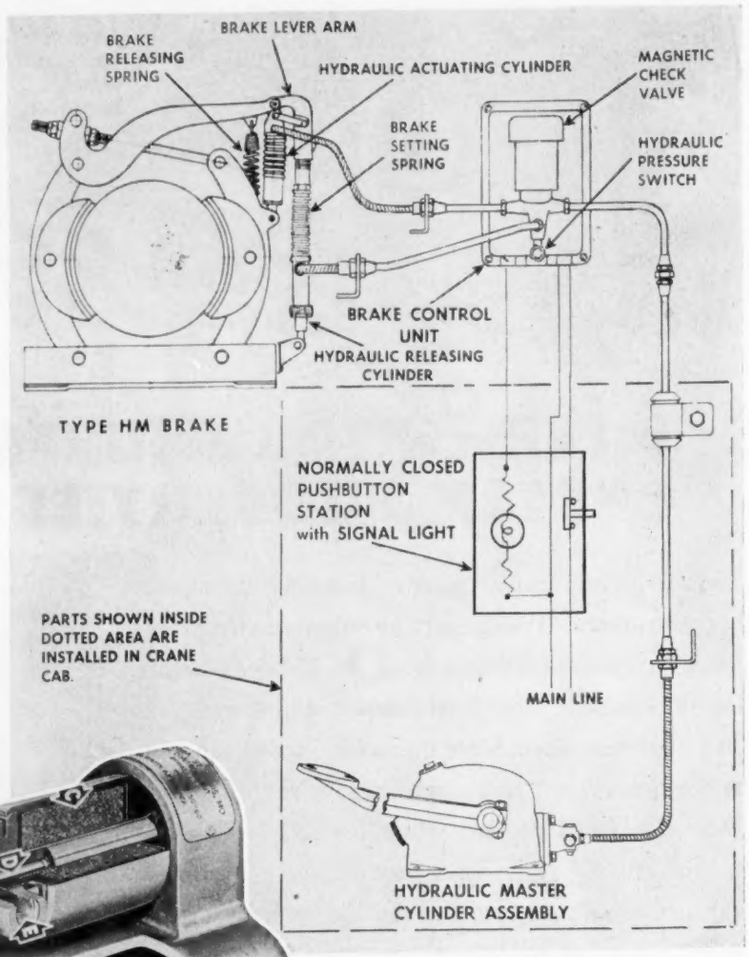
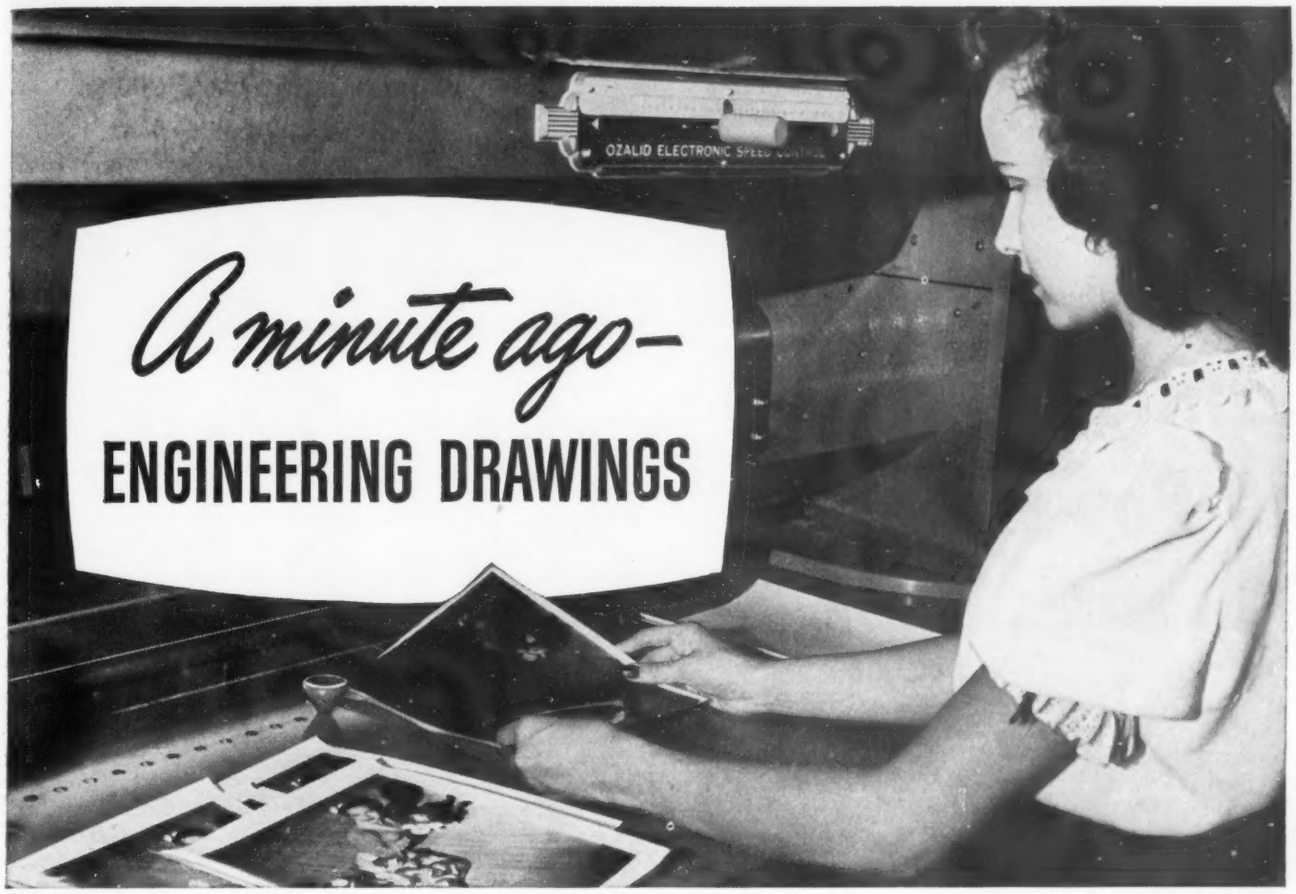



*Fig. 1 (left)—Cut-away view of automatic crane brake control unit*

*Fig. 2 (above)—Schematic diagram of crane braking installation including electrical connections*

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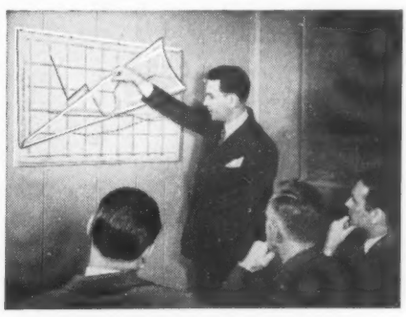

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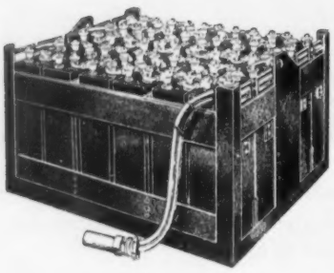

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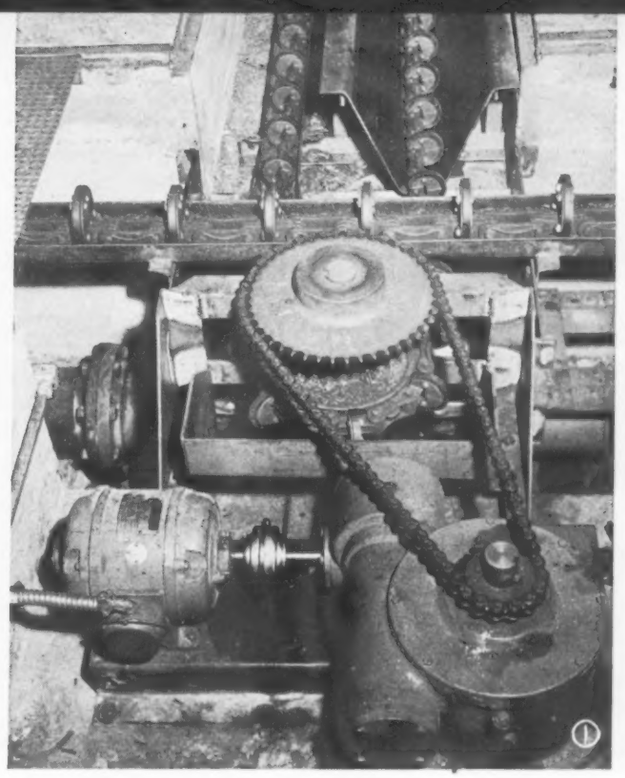
ALKALINE BATTERIES

# CHIP CONVEYOR

***Packard and Hapman engineers collaborate on installation of 5000-ft chip conveyor system to eliminate nearly all manual handling of automotive borings and turnings***

By A. H. ALLEN
Detroit Editor, STEEL



**A CHIP conveyor, affording maximum flexibility and employing for the first time in the automotive industry the use of abrasive-resisting synthetic rubber, has been installed by the Packard Motor Car Co., Detroit. Built by Hapman Conveyors Inc., Detroit, in conjunction with Packard engineers, the system extends more than 5000 ft, including both forward and return lengths, through departments machining cylinder blocks, cylinder heads and exhaust manifolds.**

With the turning radius of the system's rubber flights limited only by bending capabilities of the conducting pipes, the installation of the conveyor has permitted a closer and more efficient grouping of machining operations, as well as eliminating nearly all manual handling of borings and turnings. Virtually all chips from the 181 machines serviced by the system fall directly through a floor grating covering a conveyor trough and are moved to a briquetting department.

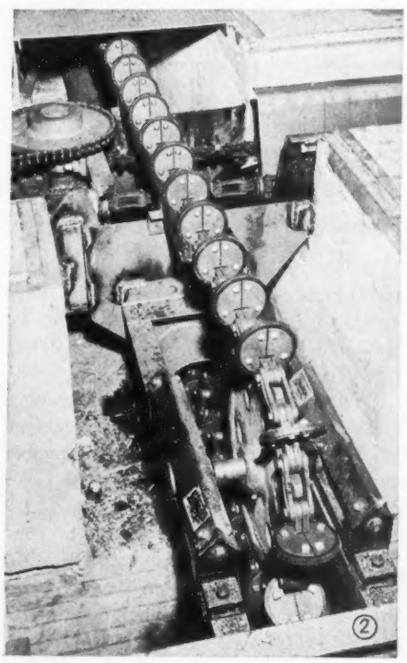
Power for the system is supplied by eleven 1-hp and four 3-hp motors. Conducting pipes' sizes range from 4 to 8 in., depending on volume of chips to be handled. The system includes 11 cross conveyors and 14 transfer hoppers. A chip deposited at the farthest point from the briquetting plant will require 4½ hr to move through the system.

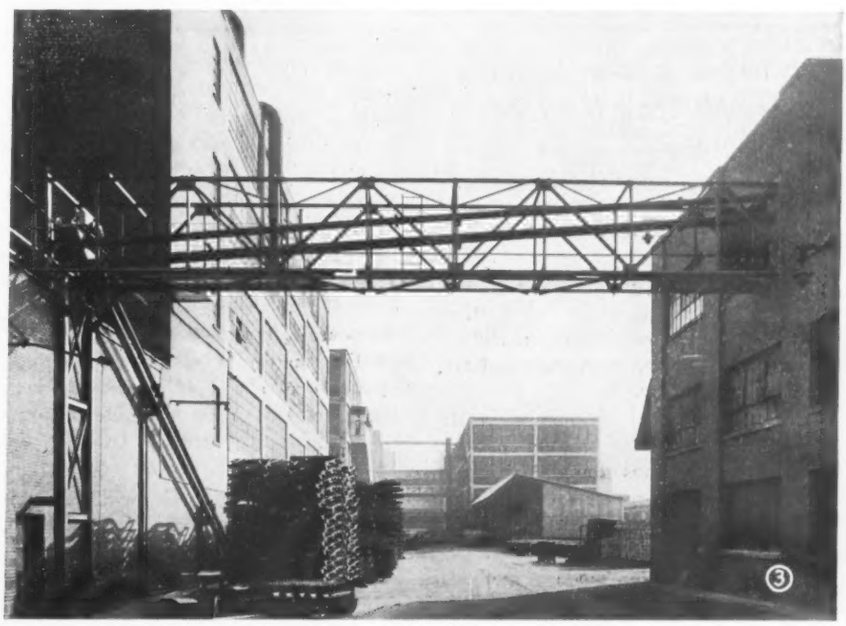
Requirements for the system called

*Fig. 1—Floor grating removed to show section of return conveyor in a 6-in. open channel. (Top) A 4-in. feeder conveyor chain operates through an open trough and returns in 4-in. open channel. Drive is by 1-hp motor and speed reducer in foreground*

*Fig. 2—Take-up end of main conveyor, and cross conveyor with transfer hopper*

*Fig. 3—Chips are moved through the lower pipe on bridge from machining department at left to briquetting plant at right*





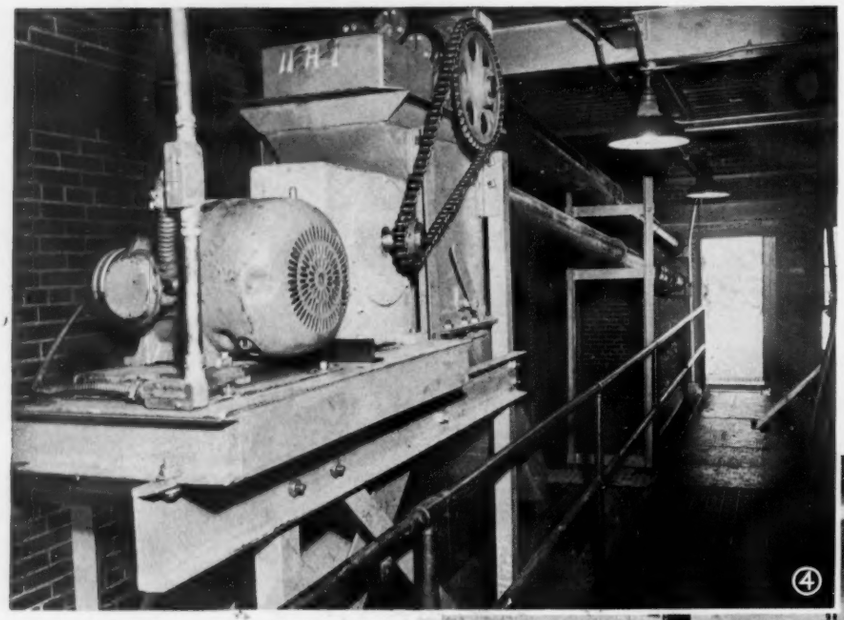
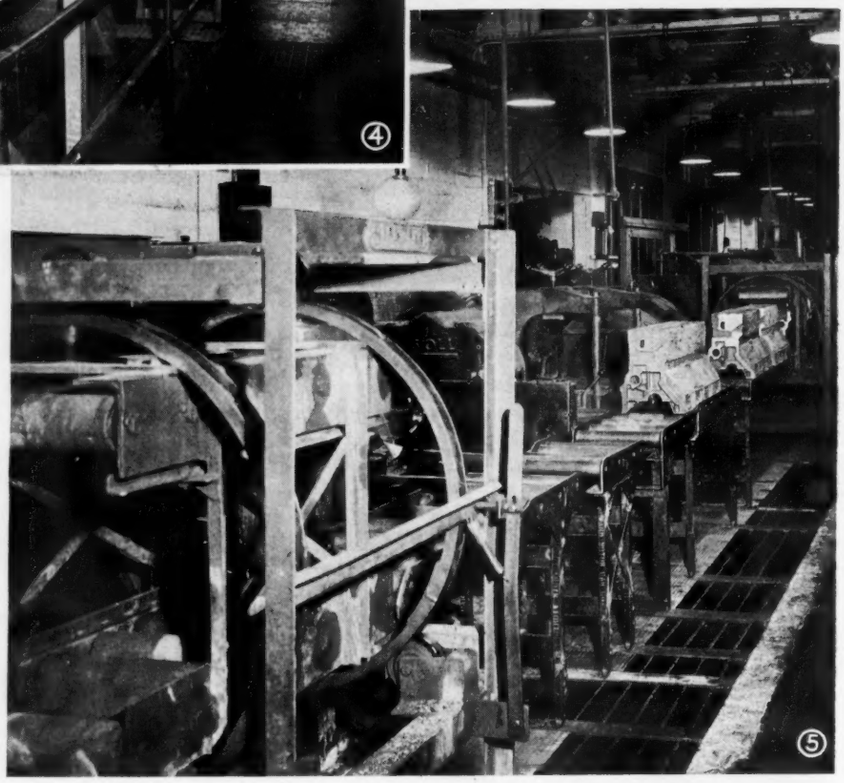


*Fig. 4—Discharge end of conveyor system in briquetting plant. Lower pipe, through which chips are brought to bins, is 8-in. in diameter. Upper pipe, through which rubber-edged conveying disks return, is 6 in. in diameter*

*Fig. 5—By eliminating chip piles and pans, chip conveyor permits closer grouping of machines and reduction of aisle space. Chips drop through floor grating into conveyor trough*



for disposal of 40 cu ft of chips per hour. It is estimated capacity could be increased three times without supplementing existing facilities.

Tests on smaller models of the system indicate life of the rubber forcing disks will exceed that of the conducting pipes, which can be quarter-turned as wear is detected on inside surfaces. Longer wearing qualities of the new system are enhanced by use of sealed conveyor link pins, utilizing self-lubricating rubber washers which prevent wear by abrasive dust. Through elimination of metal-to-metal contact, the system is virtually noiseless in operation.

Accompanying photos show special features of the system as installed at the Packard company.

## Kearney & Trecker Catalog Covers All Their Machines

A new 48-page general catalog and data book issued by Kearney & Trecker Corp., Milwaukee, not only gives detailed specifications of all this company's milling, precision boring and cutter grinding machines, but also illustrates many production setups possible on these machines with various standard accessories that are available to industry.

The introductory chapter of this book includes a brief history of the company, which was founded by the late E. J. Kearney and Theodore Trecker (now its president) in 1898. This is followed by several illustrated pages devoted to modern methods of machine tool design and construction as practiced today in the company's 14-acre works in the outskirts of Milwaukee. Engineering service available to customers also is dealt with.

Pages devoted to specifications and dimensions carry tables, line drawings and photographs which give tool engineers and production engineers all data needed to plan setups. Dimensions are given both in English and in the metric system—metric dimensions in color and inch dimensions in black so that there can be no confusion when the user is reading the tables.

Copies of this book will be sent free of charge to those in production, engineering, purchasing or other executive positions, who so identify themselves by writing for it on the letterheads of the companies with which they are connected.

## Lathe Design, Operation Subject of New Book

The why and how of lathe design and operation is the subject of a new 160-page illustrated book published by Shell Oil Co. Inc., 50 West 50th street, New York.

Designed to serve the metal-working industry, book outlines fundamentals of machine tool design and performance, and covers basic characteristics of lathe construction and operation.

Priced at $7.50, book is said to contain over 500 charts, photographs and drawings, many of them in two and three colors. Detailed illustrations show precise functioning of lathe parts.

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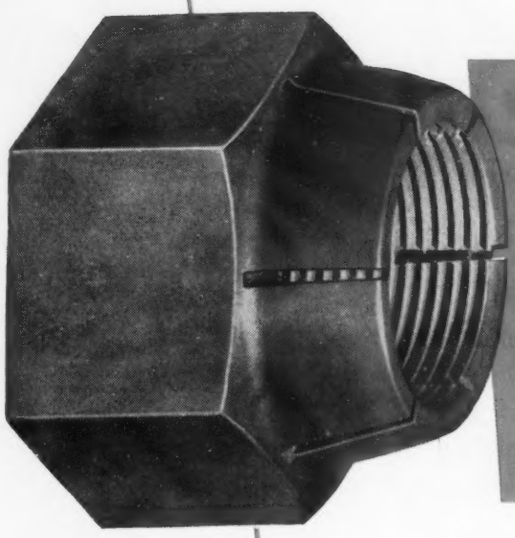

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**2 Self-locking action**—the Huglock Nut grips the bolt threads and maintains locking effect, whether seated or not, on the load-carrying flanks of the threads.

**3 Axial thread play eliminated**—Huglock Nuts are vibration-proof and shock-proof.

**4 Thread load is distributed** over all the threads of the nut, instead of being concentrated on the few bottom threads.

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**10 Controlled preset torque values** are built into Huglocks, insuring the vibration-proof results visioned in your engineering designs.

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By GURDON M. BUTLER
*Associate Director of Research*
Allegheny Ludlum Steel Corp.
Pittsburgh

# hot extrusion of steel tubing

***Author describes process employed by Mannesmann Tube Works at Annen, Germany. Amount of graphite and oil poured over billet is carefully determined to avoid an explosion during extrusion. Mandrel coated with weld metal of same analysis as die ring. Coating ground to ⅛-in. thick and then heat treated. Mandrel life ranges from 400 to 500 tubes***

IN contrast to the common piercing method of making seamless steel tubing in the United States, the hot extrusion method is being used to some extent in Germany; and in England most stainless steel tubing is hot extruded.

The extrusion process employed in one of the units of the great Mannesmann Tube Works has apparently competed successfully for years against more familiar methods of company's other plants.

Products of the Annen plant ranged from ordinary mild steel pipe for gas and water lines through several low-alloy steels to the austenitic stainless steels. The method has been limited to relatively small tubing ranging from 3.6 in. OD down to 1.5 in. OD, with wall thicknesses of 0.08 to 0.12-in. in soft steels and 0.16 to 0.18-in. in stainless steels. Lengths of 22 ft are extruded. Although sizes larger than 3.6 in. OD have been extruded, they were found to be more expensive and of poorer quality than those made by conventional piercing methods. The principal difficulties were with uneven wall thickness and high tool cost.

Quality of the present range of sizes is believed by the management of the Annen plant to be as good as, and their costs lower than those of other Mannesmann plants. The tubes that were examined had fairly good surfaces and bores, but shallow score marks were common. These were said to be removed in subsequent cold drawing. No cracks were noted and the management would not admit having trouble with transverse tears or poor surface. They reported higher recoveries from billet to tube and a scrap loss of less than 1 per cent defective tubes. To extrude 1000 lb of hot-finished tubes, only about 1130 lb of billets were said to be required as compared with an estimated 1200 to 1250 lb of billets necessary in piercing mills.

The rate of production of tubes, 120 to 140 per hour, seems undesirably slow but probably this could be increased considerably by improved methods for handling billets, cutting off tubes, and changing dies. Low labor costs apparently made such refinements uninteresting to the Germans. The cost of dies and related parts appeared to be high, based on the short lives obtained from them.

Extrusion of stainless tubes, both 17 per cent chromium and 18-8, is done the same as with plain carbon steels. High-speed steels and 25-20 stainless have not been tried. Results on bearing-race steel like SAE 52100 were not satisfactory.

**Outline of Process:** Details of the

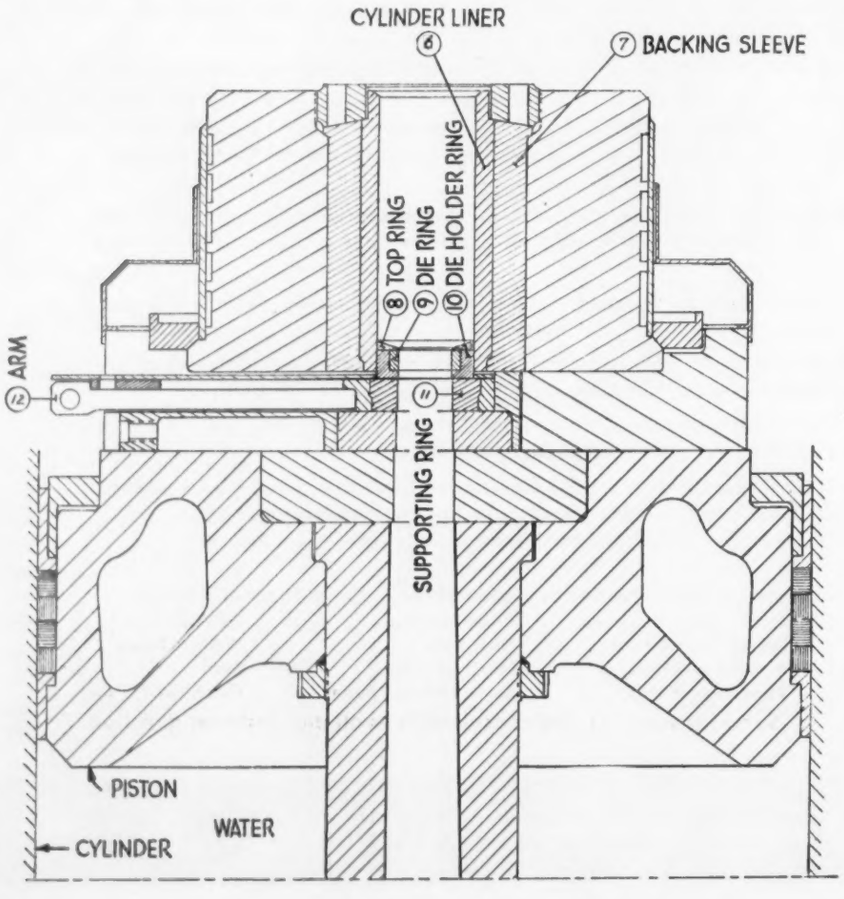
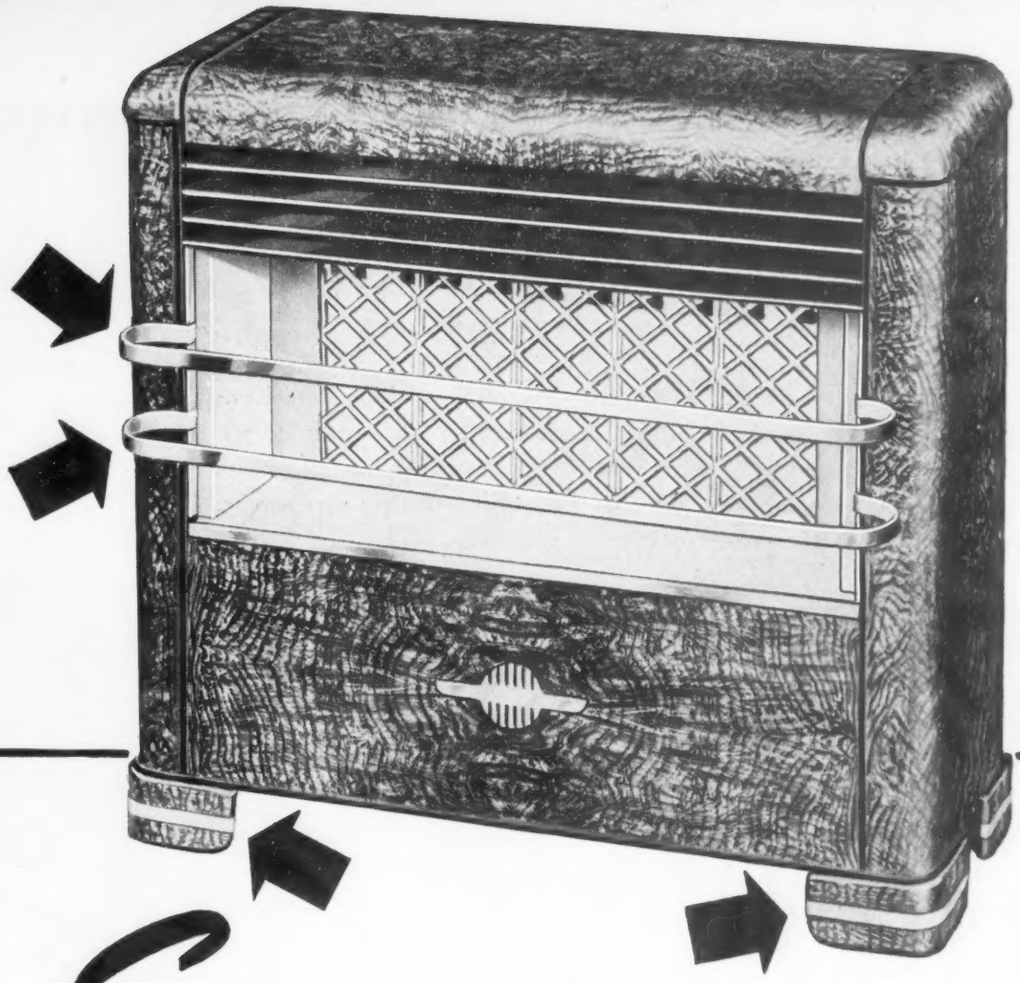



*Fig. 1—Cylinder and die assembly, through which the mandrel and extruded tube pass, are supported by a piston in a water-filled cylinder mounted on the lower frame of the crank press*



# *Easy ways*

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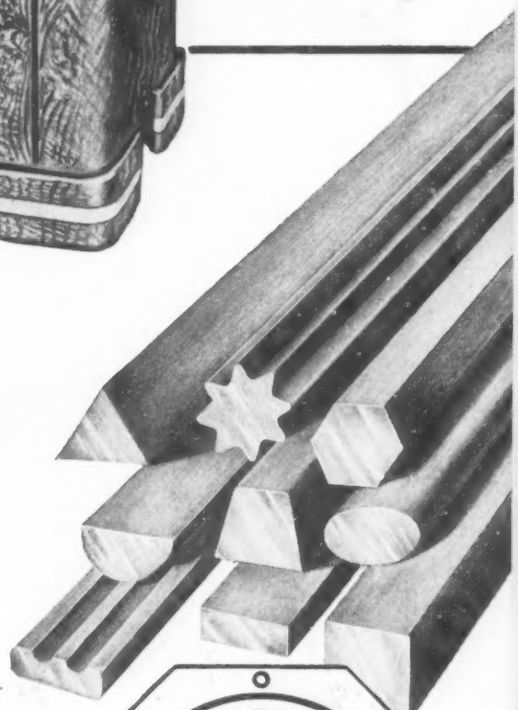

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operating cycle were outlined by Director Mueller and Chief Engineer Wellman as follow:

1. Billets to be extruded are cold-sawed in 12-in. lengths from bar stock purchased from Krupp. Billet size ranges from 4.5 to 6.4 in. diameter.

2. Billets are heated in a continuous furnace in which either gas or coal can be used for fuel. Mild and low-alloy steels are heated to 2280-2315°F, 17 per cent chromium stainless steels are heated to 2190-2215°F, and 18-8 stainless to 2100-2150°F.

3. With the exception of stainless billets, which cannot be effectively descaled, all billets are passed through a set of scale-breaking rolls similar to a Medart straightener.

4. Billets slide down a chute from the descaling rolls and are transferred with hand tongs to the vertical cylinder of an upright crank press.

5. A lubricating mixture of graphite and oil is poured over the top of the hot billet so that it flows down the sides. The amount of lubricant is judged carefully by the operator, for too much may cause an explosion when extrusion begins.

6. In one revolution of the crank a slug is punched out and the balance of the billet extruded. The actual extrusion of the tube, which is outlined below, occurs in 1½ to 2 sec.

7. After cutting loose from slug left in cylinder, the tube is straightened, cut to length, pickled, lime coated, and cold-drawn through soap. (The cold-drawing section of the Annen plant was destroyed by bombs.)

**Press and Tool Setup:** The plant has three vertical double-acting crank presses of conventional design, two of which are rated at 1000 gross tons and one at 1250 tons. A 1000-ton press was the only one of the three in commission at the time of the visit. The presses were designed to make one revolution of the crank shaft in 15 sec, being driven by an electric motor through a clutch and a series of spur gears at both ends of the crank shaft.

The crosshead is made in two parts, an inner member, which is free to slide up and down within an outer member, which in turn moves within guides on the press frame. The inner member receives the direct thrust of the connecting rod from the crank through a wrist pin. The outer member of the crosshead is actuated by four rods connected to the outer ends of levers pivoted at their centers and riding at their inner ends on a cam surface concentric with the crank axis. The pivot points of these four levers are carried on arms from the inner member of the crosshead. As a result, when the inner member starts to descend, the outer ends of the levers descend twice as fast and the thrust of the rods connected to the outer ends drives the outer crosshead member downward along the inner member.

The inner member carries a hollow, internally-cooled mandrel (2), shown in Fig. 2, which first punches out the center of the billet and then slides within the die ring (9) in Fig. 1 to form the inside of the tube. The ram strikes the top of the pierced billet and forces it down through the annular space between the die ring (9) and the mandrel (2). The lever system slides the sleeve (5) carried by the outer member down into contact with the slug. The continued downward motion of the inner member then pulls the inner ends of the levers away from the crank cam and sleeve stops moving while the mandrel is forced downward through the slug. When the bottom of the inner member to which the mandrel is fastened reaches the bottom of the outer member, as shown in Fig. 2, the direct thrust of the connecting rod is transmitted to outer member. Thereafter both sleeve and mandrel move downward as a unit while the actual extrusion occurs.

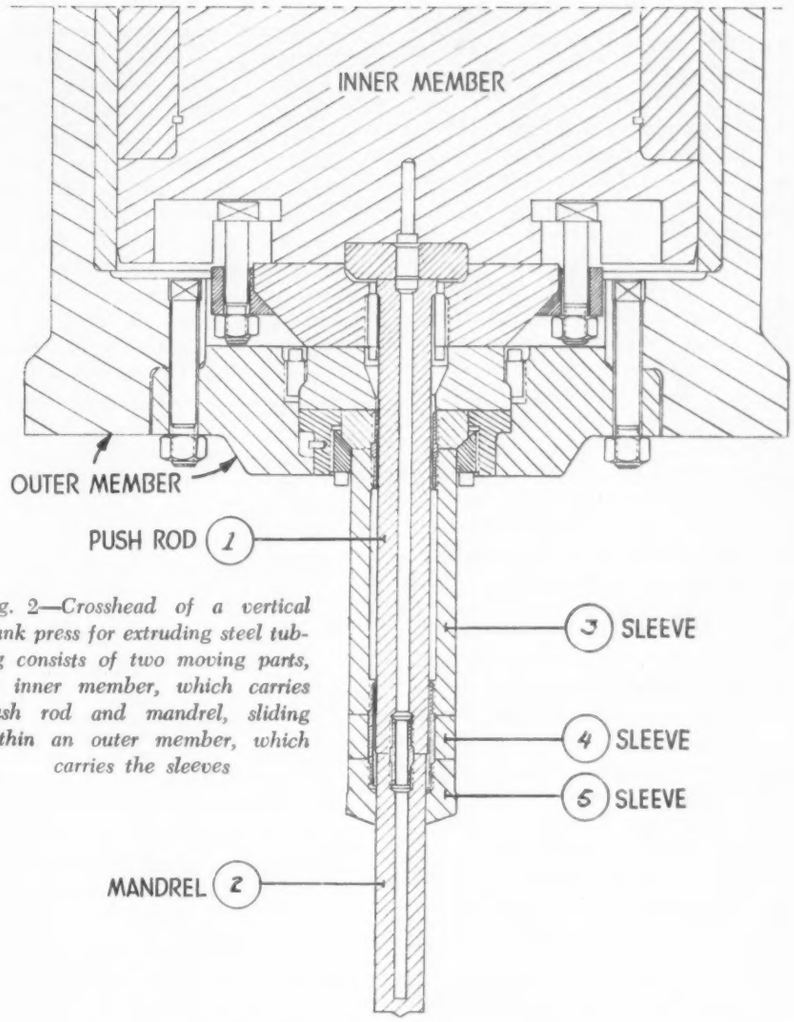


*Fig. 2—Crosshead of a vertical crank press for extruding steel tubing consists of two moving parts, an inner member, which carries push rod and mandrel, sliding within an outer member, which carries the sleeves*

After reaching the bottom of the stroke, the inner member moves upward and withdraws the mandrel from the upper end of the extruded tube. The tube is held within the die ring by the sleeve (5), which stays down on the cone-shaped residual slug left at the bottom of the cylinder during withdrawal of the mandrel.

As the end of the mandrel pulls up into the sleeve, the upward movement of the inner member carrying the lever system brings the inner ends of the levers back against the crank cam, whereupon the outer member is pulled upward again at twice the rate of the inner member until both return to their initial positions at the top of the stroke.

The lower portion of the press frame carries the cylinder and die assembly, which are shown in Fig. 1. The cylinder liner (6) and backing sleeve (7) are held by a screw ring in a massive block whose outer surface carries passages for cooling water. At the bottom of the cylinder is the die assembly, consisting of the beveled top ring (8), the die ring (9), the die holder ring (10), and the supporting ring (11). When it is necessary to change die rings, the supporting ring (11) is pulled out by means of a hydraulic cylinder connected to the arm (12). Then the die and related parts are pushed down into the space

previously occupied by the supporting ring and pushed out through a slot which is not shown.

The entire unit rests on top of a piston moving in a water-filled cylinder fixed to the lower frame. A safety valve permits escape of water if the pressure should become excessive.

At the end of the extrusion cycle, when the mandrel and sleeve are back up to their top position, the extruded tube is cut free from the conical slug left in the cylinder by dropping in a punch with diameter equal to the outside diameter of the tube and a pilot that fits inside of the tube. A hydraulic cylinder, which is mounted on a U-shaped frame with ends pivoted in trunnions fastened to the press frame and normally lies on its side beside the cylinder assembly, is now swung to a vertical position centered over the cylinder. A quick stroke of the hydraulic piston forces the punch down and shears the tube free from the slug. The punch and adhering slug are lifted out with tongs.

The extruded tube, as it passes downward, is deflected horizontally into a guide chute beneath the press and onward into a reducing mill having several sets of grooved rolls, from which it emerges onto a cooling bed.

**Steels for Heat Exposed Parts:** Ferrous extrusion has been regarded in the U. S. as impractical, largely owing to inadequacies of available hot work materials, which mean uneconomically short life for dies and related parts. Apparently, however, the Germans have been no better off in this respect.

The mandrel (2) and pushrod (1) in Fig. 2 are made of steel containing 0.27 C (carbon), 0.3 Mn (manganese), 0.3 Si (silicon), 4.5 W (tungsten), 1.5 Cr. (chromium), 4.5 Ni (nickel), 0.2 V (vanadium), and 0.5 per cent Mo (molybdenum), hardened at about 1875°F and drawn to about 440 brinell. These parts are water-cooled internally and also cooled externally by an air blast between pushes. The part that is exposed to the hot slug is coated with weld metal about 5/32 in. thick. The coating is applied by electric arc welding with a bare rod of the same analysis as that of the die ring. After grinding the coating to about ⅛-in. thick, the mandrel is heat treated. No metal is deposited on the bottom end of the mandrel.

Herr Wellman admitted that this deposit sometimes chipped and spalled, even to the extent of jamming the mandrel inside the slug, and that the bottom corner was most prone to chip. He felt that the coated mandrels gave sufficiently superior results to warrant the cost and bother of this rather peculiar practice. After extruding 150 to 200 soft steel tubes (fewer of stainless), the mandrel is ground to a slightly smaller size and used for a different tube size. A total mandrel life of from 400 to 450 tubes is thus attained.

**The author, serving as technical investigator for the U. S. Ordnance Service, visited the Annen plant of the Mannesmann Tube Works in the Ruhr in the early summer of 1945. This article is based upon the facts reported in Ordnance Target Report No. 46, which is available through the Department of Commerce. The assistance of the War Department in making this investigation and accompanying article possible is gratefully acknowledged by the author.**

The sleeves (3,4,5) are made of steel with 0.24 C, 0.3 Mn, 0.3 Si, 8.7 W, 2.2 Cr, and 1.5 per cent Ni. Prior to the war, this steel also contained about 2 per cent Co. It is oil-quenched from about 1950°F and drawn to 425 to 440 brinell. The sleeves (5) are also coated on the outer surface with the same steel as used on the mandrel, chiefly to repair and restore it to proper size.

The die holder (10) and beveled top ring (8) are made of the same steel as the sleeves, except that a greater effort was made to get the cobalt-bearing type.

The cylinder liner (6) is made of a steel with 0.4 C, 0.5 Mn, 0.8 Si, 3.6 W, 1.1 Cr, and occasionally 0.15 per cent V. This is supplied to the Annen plant as a solid statically-cast slug, which in put into the extrusion press and the center hot-punched out. The liner is then annealed, turned to size, and heat treated by oil quenching from about 1875°F and drawing to about 375 to 400 brinell. After making about 800 tubes, the liner is removed and annealed by air-cooling from 1000 to 1100°F, in order to soften the inner surface, which becomes hard and brittle in service. After it is machined to the next larger standard size, it is put back into service without further heat treatment. Total life of soft steel is about 3000 to 4000 pushes. The backing sleeve (7) is made of the same steel and in the same manner as the liner itself. Efforts to substitute a lower-alloy steel were unsuccessful.

The die ring (9) is of particular interest. The steel for it is a "hammer-hardened" pseudo-austenitic steel containing about 0.4 C, 0.6 Mn, 1.8 Si, 14 Cr, 5.5 Ni, 3 W, and 0.2 per cent Mo. The prewar nickel content of this steel was 14 per cent, making it the equivalent of the internationally-used air-craft exhaust valve steel; but wartime conservation measures required the lower nickel content. According to the Annen officials, this cut in nickel made little difference in performance, though this seems dubious. The manufacturers of the rings said the lower-nickel steel was much more difficult to make.

These rings were made in a small tool-steel plant, Edelstahlwerk Dusseldorf-Heerdt. Hans Becker, the owner of this plant, stated that pancake forgings were made from slugs cut from billets by heating to about 1830°F and forging until the temperature of the steel had dropped to 1200-1300°F. The finishing temperature was varied, depending on the hardness desired in the finished die ring. He stated that those supplied to Mannesmann ran about 293 to 321 brinell. The pancake forgings were machined by the steel plant to the outside dimensions and then bored out at the tube mill to the desired inside diameter, using carbide tools.

Dimensions of two used dies taken to the U. S. for study were 3.7 in. OD, 2.4 in. ID, and 1 in. thick. Both were strongly magnetic. Hardnesses on cross sections varied from 38 rockwell C to as high as 48. It was apparent that hardening had occurred in service, probably owing to the low critical transformation temperature of this alloy. Heating sections at 1400°, 1500°, and 1600°F for 2 hours and air-cooling gave hardnesses of 37, 40, and 43 rockwell C respectively, confirming the hardening tendency.

Failure of the die rings occurs by flowing under the extrusion pressure so as to close in the hole, and by becoming rough in the bore so as to score the tubes beyond a permissible amount. Dies are left in place for 30 to 50 pushes, then removed and turned to the next larger size.

Die rings are made of the best material available to this plant for such work. Trials of sintered carbides and high-cobalt steels resulted in unexpected breakages. As previously mentioned, the same analysis is used for welded coatings on mandrel and sleeves.

It is noteworthy that no "dummy block" is used, nor are dies changed after each push, as is common American practice in copper-base extrusion.

**Extruded Composite Tubes.** One German mill near Frankfurt extrudes composite tubes. The exterior is mild steel and the interior copper or a copper-rich alloy, comprising roughly a fifth of the total wall thickness. Supposedly this is made by drilling out a billet of steel, then inserting into the hole a tube of copper. After sealing the extremities of the annular space between the two tubes by copper-brazing, the assembly is extruded much as described in the preceding sections, though at lower temperatures.

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*Iron and Steel Operators*

# STRESS IMPORTANCE OF RAW MATERIALS

*Technical papers presented at 54th general meeting of the American Iron and Steel Institute, Waldorf-Astoria Hotel, New York, May 23, place great emphasis on the preparation and use of materials charged into by-product coke ovens, blast furnaces, open hearths and electric furnaces*

**Preparation of Raw Materials for Fast Melting in an Electric Arc Furnace,** by S. D. Gladding, superintendent, Alloy and Tool Steel Division, Bethlehem Steel Co., Bethlehem, Pa.: Although the charging arrangement may vary in the different plants, there is, in general, a fair agreement among large furnace operators making constructional steels regarding the proper ratio between heavy, medium and light scrap to make up an ideal charge, and concerning the proper sequence and positioning of these materials in the furnace.

It is almost universally accepted that the desirable charge should be of such a density that all scrap may be charged in one operation, or with a minimum of recharging after the scrap has melted. Whenever it is necessary to recharge, the lighter weight scrap should be used to permit as rapid melting as possible, without excessive heat radiation to roof and sidewalls.

The weight of scrap varies from about 250 lb per cu ft for ingots and bloom crops to 40 to 50 lb per cu ft for bundles of compressed turnings and light railroad and automobile scrap.

Scrap should be arranged with the heavy pieces at the bottom, to protect the bottom refractories from the intense heat of the arc until the first pool of metal is formed. About 35 to 50 per cent heavy scrap constitutes an ideal charge under normal conditions. This is followed by the medium scrap, 25 to 40 per cent, and finally by the lightest scrap, about 25 per cent of the charge, on top. The ideal condition is to have a material on top that is loose and light enough to permit the electrodes to bore themselves into the charge quickly.

The primary objectives of segregation are to save virgin alloys by recovering as much of the alloys from the scrap as possible, and to remove tramp elements such as copper, zinc, lead and tin which are particularly prevalent in battlefield scrap and in scrap made available through contract terminations and reconversion.

Segregation of purchased scrap is best accomplished by chemical analyses of each incoming car load, and careful sampling methods must be developed for the various types of materials coming in. Spot and spark testing and visual inspection are also used extensively. It has been found advantageous, for instance, to make spark and spot tests at the loading platform after the scrap has been placed in the charging buggies. This insures maintenance of segregation up to the moment of charging and has paid dividends in preventing missed heats.

The most commonly used methods of preparation are as follows—

Long scrap is sheared or torch-cut if too bulky and cumbersome.

Heavy castings, forgings and sinkheads are often blasted with dynamite.

Stringy turnings may be crushed in hammer mills or, if oily, ignited and burned in large piles on the ground.

Light scrap, such as wire and tin plate, is bundled, while light turnings may be briquetted.

Skulls and heavy fragile materials are broken with magnet hoist equipped with a large steel ball.

Nonferrous materials and dirt are removed manually after visual inspection, although a magnetic separator or standard lifting magnet may serve well if the scrap is not too tangled or interlocked.

Both on single-slag heats and on heats made with two slag, all raw materials should be dried at temperatures between 500 and 1200° F. Any appreciable amount of moisture in the charge will result in absorption of hydrogen in the metal bath. Rotary kilns are recommended for this purpose.

The method of placing oxidizers, carburizers and fluxes in the furnace varies somewhat according to the type and grade of steel made. In the manufacture of the constructional electric furnace steels it is desirable to charge an excess of 10 to 20 points of carbon in the form of electrode turnings, pig iron, anthracite coal or mold scrap. These additions should be made early, preferably on top of the first layer of heavy scrap charge. Use of mill scale or scarfing scale is recommended to give an early agitation of the bath and when charged it should be placed in the middle of the charge for maximum effectiveness.

It is desirable to use a dry, calcined, low-sulphur, high-grade lime instead of limestone, and when used, it should be charged, together with any iron ore required, after the heat is about 75 per cent melted.

To save furnace time, virgin nickel and molybdenum, when needed, are preferably added by placing them in the middle of the charge.

As soon as a charge has melted down, the temperature should be read and samples taken for slag and metal analysis. Rapid chemical and spectrographic analyses are of vital importance in reducing furnace time per heat.

**Effects of Variations in Raw Materials on Basic Open-Hearth Operations and Production,** by C. R. FonDersmith, superintendent, Steel Production, American Rolling Mill Co., Middletown, O.: Experience has indicated that, as the practice changes from cold pig to hot iron and later on to a flush-off, using larger and larger amounts of hot metal in the charge, better production rates are obtained by decreasing progressively the desired silicon content of the hot metal. This is accomplished either by operating the blast furnace in the lower ranges, such as 0.50 to 0.70 per cent, or by a method of scale treating higher silicon iron to reach this desired lower silicon.

It is always questionable if it pays to save at the blast furnace and use higher sulphur iron in the steel plant, with consequent higher lime charge or additions. With a practice where the melt is of short duration, the sulphur limits become wider without hurting either the final sulphur in the steel or the furnace time.

Value of scrap iron to the open-hearth operator depends first on the physical

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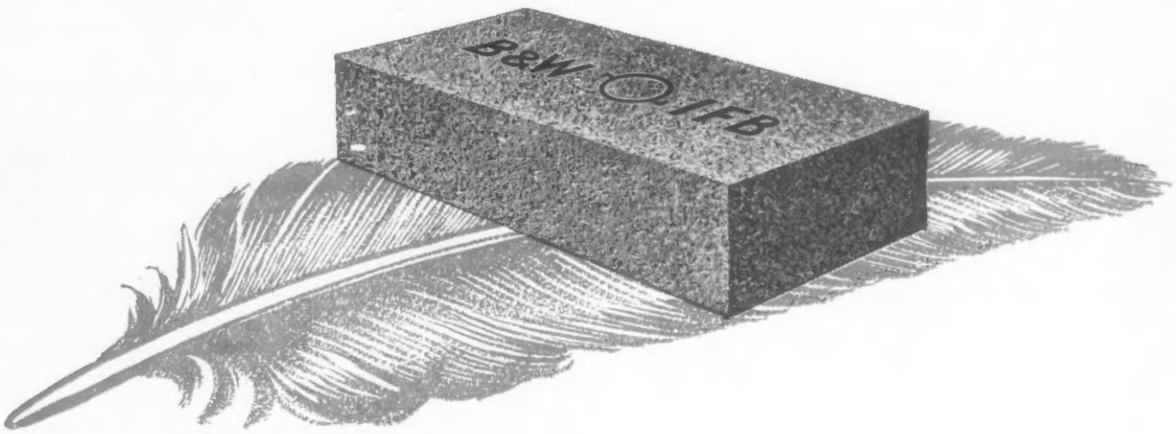


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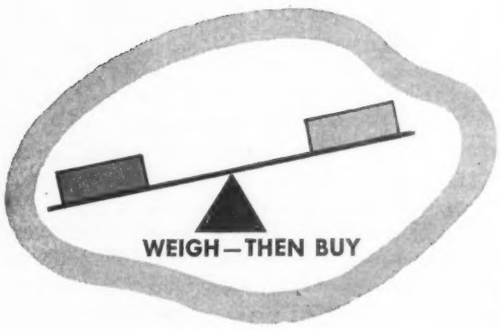


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characteristics that enable it to be loaded and charged rapidly. This by no means counteracts alloy contamination in fast charging scrap, because, in this case, the operator would simply be making an off-grade heat at a high rate of production.

Lead, tin, zinc and antimony are detrimental to the rolling properties of the dead soft steels. Copper content for best drawing results should be held well under 0.075 per cent. For highest quality performance, sulphur should be held in the final products to 0.025 per cent or under.

Scrap containing much chromium is detrimental to high quality "live" steel manufacture because the chromic oxide thickens and makes the slag heavy and gummy. Nickel residuals, if above 0.04 per cent, tend to destroy the proper drawability of the final product and act in the same way as additional carbon in the steel, where hardenability is concerned. If you know that silicon is present and adjust your lime charge accordingly, even fairly large amounts of silicon scrap iron can be used and at a saving in pig iron.

Mill scale is added to the hot metal while it is being poured into the transfer ladle from the mixer cars. We add weighted amounts of scale to definite amounts of iron and drop the silicon a required amount. Thus, when sufficient hot metal is available, we charge a constant silicon hot metal of either 0.40, 0.50, 0.60 or 0.70 per cent, and, depending on how much metal we have to use, the silicon is treated accordingly. This practice helps our production rate and enables us to use a higher percentage of hot metal.

Sinter in the charge should not be too fine or too light as it floats off too readily in the flush slag. The product of the Hamilton sinter plant works better when used fairly fresh from the cars, before it has absorbed much moisture.

If the operator is furnished with a good lump ore with low silicon and low moisture content, he will do a far better job, with greater production, fewer blows, and fewer spills. With present day operating costs, an extra half hour on a heat amounts to $22.50. Improper ore can cause an open-hearth shop to lose over 7 per cent in production.

During the years, it has been found necessary to charge less and less limestone into the furnace to make quality steels. This percentage has decreased from 12 per cent to approximately 5 per cent. The usual quality guide today is to have the final slag at tap contain 2½ times as much lime as silica.

High magnesia limestone gives heavy, thick "ropy" slags not conducive to best quality finishing slags for "live" steels. Since a definite ratio between lime and silica is required in the final slag, it is self-evident that the limestone must be free of foreign matter.

The least fluorspar per ton will be used when the sizing is such that too much will not be carried over into the uptakes with the furnace gases. To be effective, the material must be applied to the slag. High silica spar is also undesirable since extra lime must be added to maintain the proper slag balance. We endeavor to obtain fluorspar with the highest possible calcium fluoride content.

Dolomite burned with iron oxide is known as burned refractory. In the Middletown open-hearth department the burned refractory is the most widely used hearth repair material. This type of refractory will fuse in the minimum of time. The saving in the time required to repair the furnace between heats more than repays the higher initial cost of the refractory. During the last 15 years the "out-time" between heats has been reduced an average of 15 minutes per heat. On a full year's operation, this out-time saving amounts to 1200 hr of productive time.

Burned crushed dolomite is used in closing the tap hole in preparing to charge the subsequent heat. The banks in front of the furnace doors and the tap hole are faced with a burned refractory.

Chrome refractory, in the shape of a plastic, shipped ready mixed in sealed cans aids in increasing open-hearth furnace productivity. It is rammed as a sub-hearth before burning in the regular grain magnesite and slag bottom. Its use in open-hearth furnace doors increases their lining life more than fivefold.

### Factors Worth Considering

Either for gaseous or driven fuel, or any combination thereof, proper attention to the correct burning and control of combustion, drafts, fuel, air balance, and similar factors will pay large dividends in lower cost and greater production. Our open-hearth furnace has no unusual fuel control instruments. It is equipped with an accurate recording oil meter that also is set by the furnace operator at the desired gallons per hour to be delivered to the furnace.

The most important trend in the silica brick field for open-hearth use is the constant endeavor to make a purer and better roof brick. Several steel companies demonstrated the lowering in roof life caused by silica roof brick containing alumina over 1.0 per cent.

Great strides have been made in recent years in the development of basic brick of various combinations of chrome and magnesite. The greatest improvement has been in the performance of unburned bricks and the development of a construction method supporting them in the furnace wall by suspension. The basic end furnace is almost beyond the experimental stage.

The greatest use for clay brick in the open-hearth furnace is in the checker chambers. The greatest attention seems to be given to new and novel designs of the contours of the flue openings. The checker construction has a definite relation to furnace productivity, and the decision as to flue design is one of trial and error and economics. The new clay graphite brick may have a place in the

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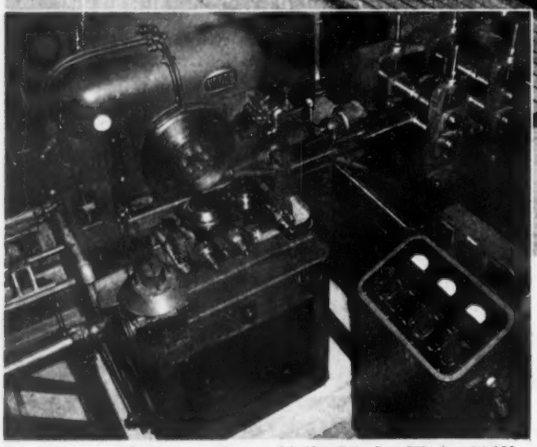

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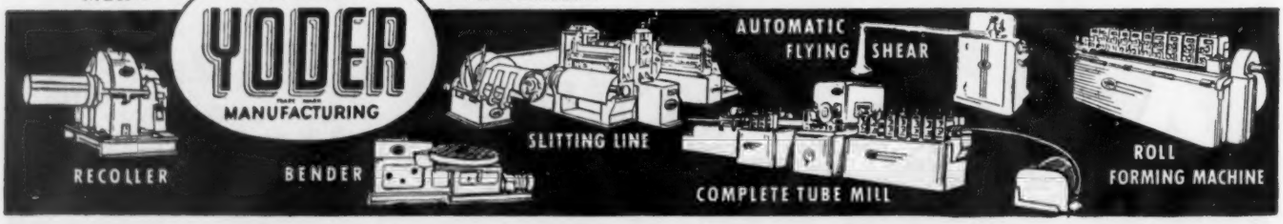


picture of increased steel production.

**Effect of Sized and Nodulized Mesabi Iron Ores on Blast Furnace Performance,** by H. F. Dobscha, Superintendent of Blast Furnaces, Edgar Thomson Works, Carnegie-Illinois Steel Corp., Braddock, Pa.: A program was carried out involving two modern, identical blast furnaces with hearth diameters of 27 ft 6 in. A mixture of beneficiated ores was charged on one furnace for a continuous period of two months and normal ores charged on the other furnace. During an interim period of one month the burdens were reversed, and the test continued for another two-month period. Coke, flux and miscellaneous burdening materials were of the same quality on both furnaces; the quantities of the latter were identical except for minor deviations dictated by operating practice.

Presence of fines in the nodules was found to be more critical in its effect upon blast furnace operations than the presence of a greater amount of fines in the coarse ore. When the "minus 20 mesh" fraction of fines in the nodules exceeded about 10 per cent, the furnace reacted quickly, particularly at higher wind rates.

The average ore density of 127 lb/cu ft for normal ores and 148 lb/cu ft for prepared ores, resulted in a greater retention capacity for metallics in the furnace operating on the prepared ore burden. Calculations reveal that the furnace operating on prepared ores contained 15.6 per cent more metallics at any one time than did the furnace operating on normal ores. Despite the increased rate of charging, the density characteristics of the prepared ore resulted in a slightly lower rate of stock descent than in the furnace operating on the normal burden.

Despite operation of the control furnace at a rate considerably in excess of its theoretical capacity, the furnace operating on prepared materials showed an improved performance to the following extent: 13.6 per cent increased iron production; 8.0 per cent decrease in net coke consumption; 20.0 per cent decrease in flux consumption; 9.3 per cent decrease in flue dust and sludge production; 31.6 per cent decrease in unrecovered metallics.

A signficant feature of the test was that furnace operating with the prepared ore burden was unable to carry as high an average blast temperature as the furnace with the normal ore burden.

The blast furnace test conducted at Edgar Thomson Works showed distinct advantages in increasing iron production and decreasing fuel consumption when using prepared iron ores. However, the results obtained do not necessarily reflect the full advantages to be gained in the preparation of ores, since the test period involved was relatively short, and the physical character of the materials used was not as good as might be expected from modern facilities specifically designed for the production of materials for blast furnace use. It is believed that with continued processing of ores and with continued furnace operation using these ores, an ultimate production rate in excess of 1700 tons of iron per day could be maintained.

Of equal importance, the test revealed the excellent iron production and fuel economy potential of large, modern blast furnaces. At the same time, it indicated the desirability of providing adequate blowing capacity to ensure the attainment of the maximum advantages possible when operating on a burden composed of prepared ores and coke made from washed

## Steel Men, Marooned In New York, Flown Home

One of the high spots of the American Iron & Steel Institute meeting in New York May 23 was the announcement by President Walter S. Tower, that Sam F. Keener, president of the Salem Engineering Co. had volunteered to aid members, marooned by the railroad strike, in returning to Pittsburgh, Youngstown, and Cleveland.

Mr. Keener, who also operates the Superior Air Line, an intrastate line serving Ohio cities, transported 32 passengers to their home cities without charge in a Douglas DC-3 and a Beechcraft.

**Preparation of Coal and Coke for Coke Ovens and Blast Furnaces,** by C. L. Potter, Manager of Coal and Coke Research, Jones & Laughlin Steel Corp., Pittsburgh: Picking tables have been installed at several of the tipples in this district to handle machine loaded coal which is to be delivered to coal preparation plants designed to clean hand loaded coal. This handpicking tends to betray one of the big advantages of mechanized mining which is the reduction of labor costs. The trend, therefore, is to do away with all handpicking and design, where possible, or build new preparation plants which can handle machine loaded coal mixed with refuse.

Low volatile coal is added to a coke mix for three main purposes:

1. To increase the coke tonnage by decreasing the volatile matter in the mix, allowing for shorter coking time.
2. To improve the physical properties and structure of the coke.
3. To decrease the ash and sulphur in the coke due to the lower ash and sulphur of the low volatile coal.

All coke oven operators are careful in determining the amount of low volatile coal which should be used because it decreases the shrinkage of the coal in the ovens and may cause stickers or damage oven walls if added in too great amounts.

There is an economical limit of the size to which the coal mix can be crushed because the bulk density decreases with fine crushing. An average bulk density of the charge in a plant using low volatile coal will average 44.52 lb/cu ft. One plant in the district using 100 per cent high volatile coal, charges 3½ in. x 0 coal to increase bulk density and thereby increases the tons per oven. Some coke plants have found it advantageous to crush to as fine as 90 per cent through a ⅛-in. screen and then increase the bulk density by adding oil to the mix.

To produce good metallurgical coke oven operators try to heat the coal charge as uniformily as possible. In new ovens where the doors seal tightly, and there are no leaks in the flues, this is a simple task, but in older ovens it is difficult. A uniform coal feed charged to a uniform depth in the ovens is a big factor in reaching this goal. The coking rate on the ovens is usually slightly more than 1 in. per hour.

Ovens must also be heated uniformly from top to bottom. This is done by regulating the length of the flame with the proper amounts of air and by-product gas. Some coke plants in the district carry cold tops purposely to prevent cracking of the hydrocarbons, which prevents excessive deposition of wall carbon and is thought to increase by-product yields.

Ovens are pushed and charged on a definite schedule, in series, pushing every tenth oven, never two ovens side by side. This is done to prevent congestion and also to prevent excess cooling of oven walls. One plant in the district uses approximately 1100 gal of water over a quenching period of 1 min to quench 8 tons of coke of an average of 140 gal per ton. It is important in the quenching operation that just enough water is added to extinguish the fire but not enough to produce a high moisture coke. After the coke is quenched it is dumped on a coke wharf and allowed to slide easily on to a conveyor belt serving the screening station.

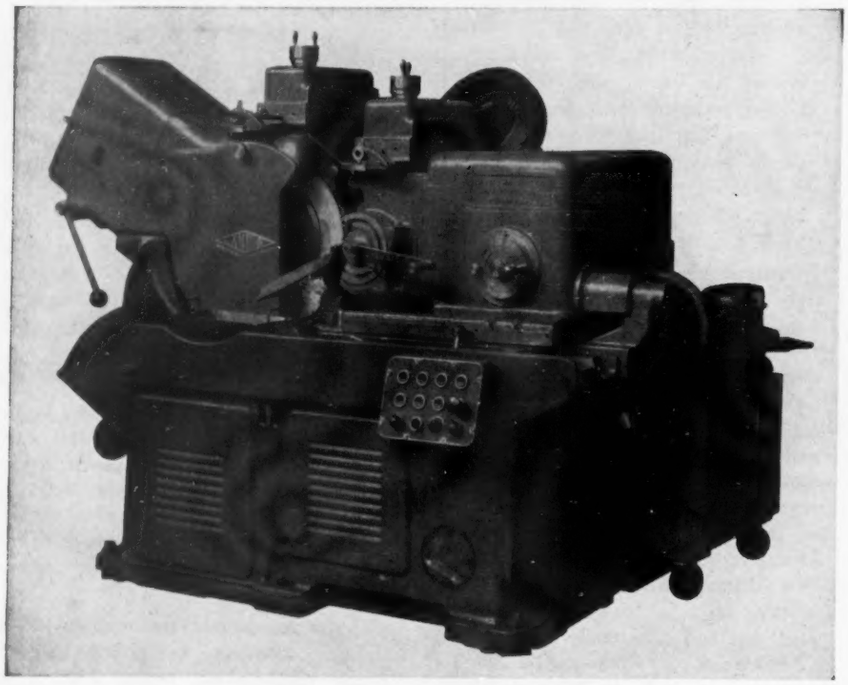
Run of oven coke which ranges in size from lumps that will not pass through a 12 in. square hole screen down to dust is not a satisfactory blast furnace fuel. To produce a good furnace coke most plants divide the coke into at least three size ranges, namely furnace coke, nut coke and coke braize.

# INDUSTRIAL EQUIPMENT

## Thread Grinder

Landis Machine Co., Waynesboro, Pa., announces centerless thread grinder for use on straight cylindrical work pieces and on headed or multiple diameter parts. It incorporates mechanisms and controls for grinding by either throughfeed or infeed method.

Single diameter work pieces are throughfeed thread ground by passing pieces continuously between grinding and regulating wheels. This method can be



used to grind threads from solid blanks or to finish threads precut prior to centerless grinding.

Headed or shouldered work pieces are centerless thread ground by infeed method. Pieces are automatically ejected at completion of operation.

Grinding wheels are dressed without disturbing setup. Operating controls are centralized at front of machine and all mechanisms are enclosed and protected from grit and coolant.

Pressure lubricated grinding wheel spindle is 4⅛-in. in diameter and rotates in multiple-shoe, self-adjusting, bearings mounted in bed of machine. Failure of lubricating system for spindle bearings stops machine automatically.

Grinding wheel is driven through V-belts by a constant speed 15-hp motor. Electronically-controlled drive provides an infinitely variable working speed range to control the wheel, and a preselected fixed speed for dressing it.

Feed work rests are adjustable for any helix angle within range of machine. Side guides for aligning work pieces with grinding and control wheels are attached directly to work support blade.

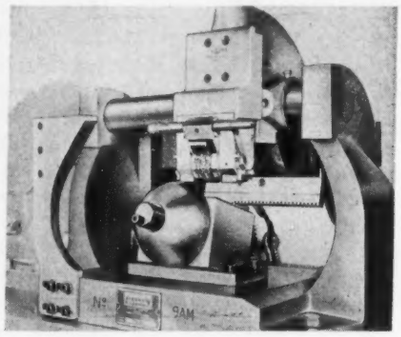
An automatic crush dresser is attached to bed of machine for forming thread forms on grinding wheel. A geared motor drives crusher roll and grinding wheel at slow speed. Size adjustments are made by a micrometer dial and handwheel built into upper slide.

*Steel* 6/3/46; *Item No.* 9514

## Serial Numbering Device

A new unit combining serial numbering with repeat marking of spherical and cup shaped metal and plastic parts is announced by Acromark Co., 398 Morrell street, Elizabeth, N. J. The attachment, for use on company's series 9A and 9AM machines, consists of a form mounted on a geared mandrel fixture to fit and hold the cup-shaped part to be marked.

A numbering device for automatic advance is mounted in the marking head. Both before and after the numbering wheels, mortises for interchangeable insert dies are placed for repeat marking. At each horizontal stroke of the marking machine an angle attachment pushes down the consecutive action lever of the



numbering machine. A rack gear meshes with the gear on end of mandrel shaft to insure synchronous rotation of part being marked with the movement of the dies.

*Steel* 6/3/46; *Item No.* 9122

## Air Chuck

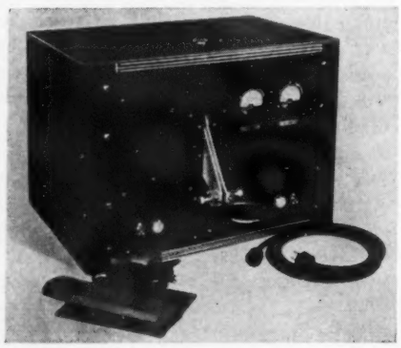
A new size collet air chuck, known as No. 10, is offered by Redmer Air Devices Corp., 601 West Washington boulevard, Chicago. Although the same size as present No. 00, it will use No. 10 collets, as used on Brown & Sharpe high-speed automatics. By using an adapter sleeve and nose cap, it will use No. 00 collets, making an effective size range from $\frac{1}{16}$ to ½-in.

*Steel* 6/3/46; *Item No.* 9237

## Induction Heater

Portable bench-type induction heater, announced by Marion Electrical Instrument Co., Manchester, N. H., was developed to meet need for clean soldering of small parts and of metal to metallized glass and ceramics.

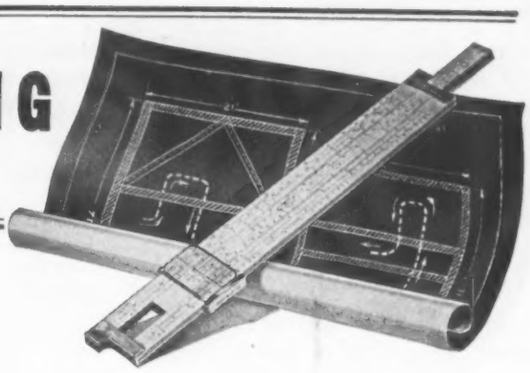
It consumes only 775 w at full load and 100 w on standby. Power is drawn



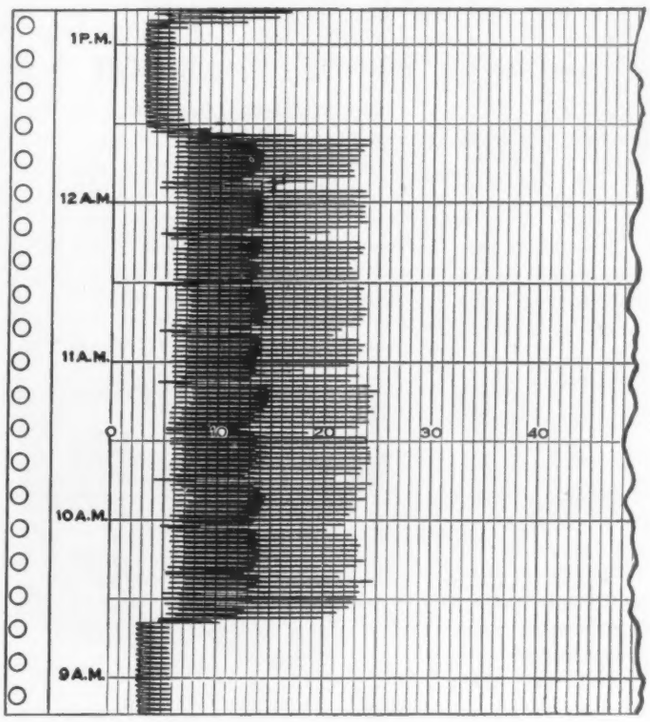
only when soldering is taking place. There is no danger of sparking or radio frequency burns from output terminals

*(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 142.)*

# OVEN ENGINEERING NEWS



## SAFETY IS POSITIVE IN ALL IOE INSTALLATIONS




The Industrial Oven Engineering Company has long been a definite proponent in designing and fabricating equipment to perform hazardous operations economically, efficiently and primarily safely.

To this end, in cases where requirements are such, continuous records are made of the explosive conditions which are encountered in the atmosphere in highly dangerous processes like fabric cementing, fabric coating and solvent evaporation; in fact conditions encountered when processing most of the synthetic materials that are in use today.

The chart above shows the continuous record of explosive conditions in a continuous fabric system that has been in operation for some time on the rubberizing of fabric.

If you will observe the record closely you will find that all of the explosive concentrations fall below 25% of the lower explosive limit. This continuous record is taken at four points throughout the complete system and meter the explosive concentrations at all critical points in the system.

In reading the chart it will be observed that 3 of the readings are in the neighborhood of 15% of the lower explosive limit, while the readings at only 1 point run between the ranges of 20 and 25%.

This particular installation is handling approximately 3 gallons of solvent grades of gasoline per minute, and this gasoline was continuously evaporated at a temperature of 180° F.

In addition to such a careful check on explosive concentration the installation was further equipped with positive and foolproof means for the dissipation of static discharges which naturally build up on rapidly moving films, fabrics or papers as they pass continuously through a processing system.

Operating economies were considered also, and they incorporated such elements as continuous operation, high speed operation, space saving and attendant labor economy.

In every **IOE** installation safety is essential because without safety production usually lags.

All **IOE** installations are designed to eliminate the hazards of explosion and mechanical failure.

We make cord coating, cable lacquering systems, complete fabric cementing systems, complete fabric coating systems, continuous takeup and payoff stands, dip tanks, drying ovens, constant tension constant speed takeup machines for plastic resin tubing and coating cords, rubber tubing, V-belt cords and other continuous monofilament or film materials.

**Write for "High-Speed Handling and Drying in the Cementing of Tire Fabric."**

**This bulletin is a description of a high-speed continuous safe method for applying cements, coatings or impregnants to continuous materials.**

IOE ENGINEERING VERSATILITY

**THE INDUSTRIAL *Oven Engineering* COMPANY**

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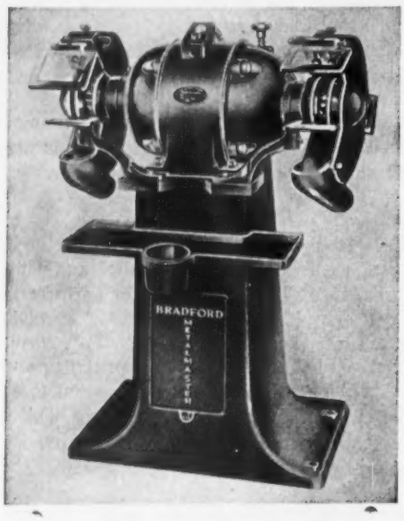
★ ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND ★

or from the work coil of the unit.

Provision has been made for use of water cooling when necessary. A 115 v 60-cycle power supply is required. Cabinet measures 15¾ x 21½ x 15 in. and weighs 150 lbs.
*Steel* 6/3/46; *Item No.* 9248

## Tool Grinder

Bradford Machine Tool Co., Evans street, Cincinnati, is manufacturing a complete line of electric tools, among which is the illustrated grinder. The grinder is a new design incorporating

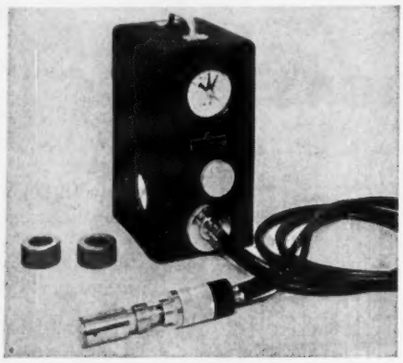



the following features: Heavy duty motor, oversize ball bearings, semisteel guards, push button station with starter having overload protection.

Other tools in new line include: Lathe grinders, automotive equipment, disk sanders, adjustable speed snagging grinders and polishers, and nut runners.
*Steel* 6/3/46; *Item No.* 9304

## Booster Relay Comparator

To enable hand gaging at a distance from comparator, Pratt & Whitney Division of Niles-Bement-Pond Co., West Hartford, Conn., is offering a new model



R2 Air-O-Limit comparator with booster relay which permits use of any length hose between the gage cabinet and gage plug without loss of speed or accuracy in gaging operation.
*Steel* 6/3/46; *Item No.* 9270

## Milling Machine

Heavy work milling machine designed to hollow mill and face shoulder on universal joint spiders is announced by LeMaire Tool & Mfg. Co., Dearborn, Mich. Feature of machine is that it is built up of four independently separated units, arranged at right angles on standard bases. These all abutt a central base which carries a special fixture. Infinite feeds are controlled by flow valve. Individual spindle speeds are controlled by separate rheostats located on variable speed units within convenient reach of operator.

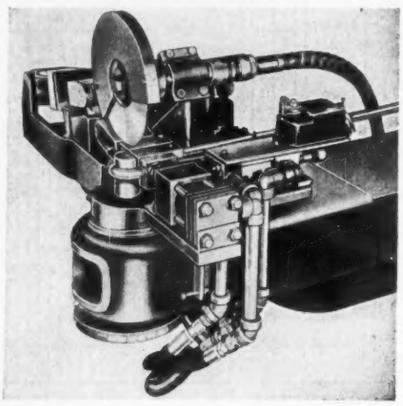
The heavy spindles are mounted in a housing which slides on large guide bars. The large opposed bearings have their front bearing positioned close to the cutter so that the front overhang of the tool is reduced to a minimum.

Coolant under pressure is forced inside the spindle to provide chip removal. Air-operated fixture has an electric interlock to prevent cycling of machine before part is clamped.
*Steel* 6/3/46; *Item No.* 9181

## Automatic Pipe Cut-Off

Pines Engineering Co., Aurora, Ill., announces an automatic cut-off which handles tubing from ¾ to 5 in. and pipe up to 4 in. The No. ¾ hydraulic bender illustrated is equipped for automatic manufacture of return bends or elbows.

In operating bender a long piece of tubing is placed over mandrel. After machine finishes bend, mandrel is extracted and before clamps are opened, the saw is passed through the tube by hydraulic power. Bending arm then returns and mandrel advances. Tube is then fed automatically and operation repeats.

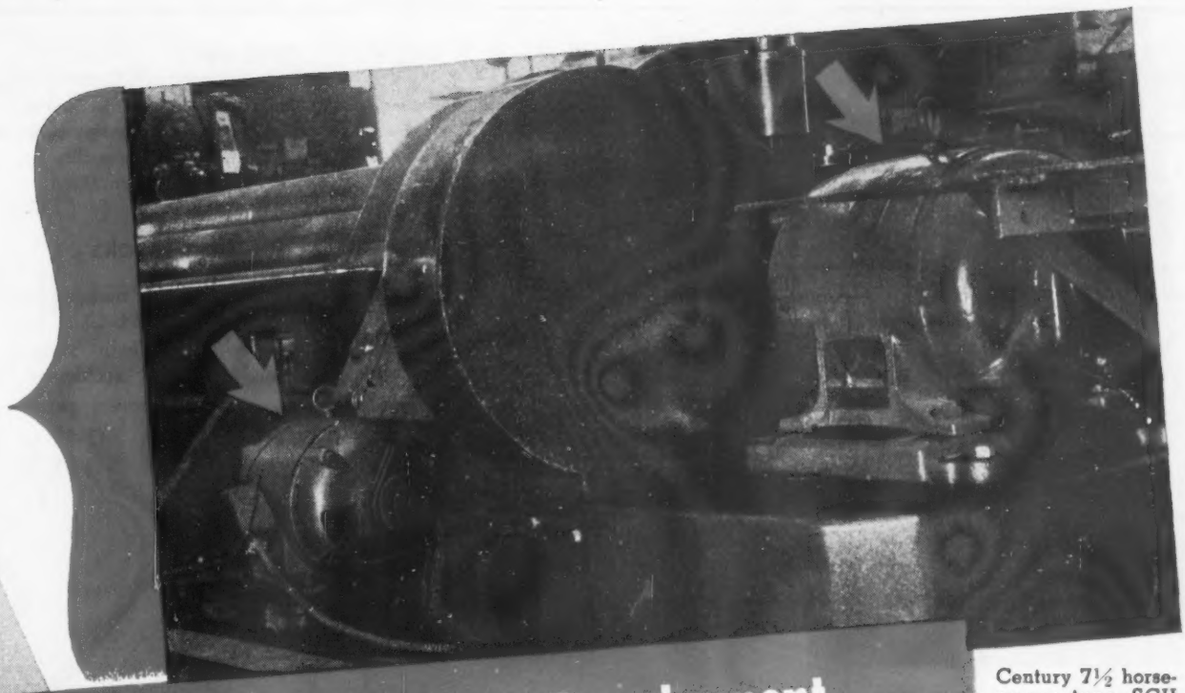


Typical production is 650 pieces bent and cut per hour from ¾ in. copper tubing, bent on a 1¼-in. center.
*Steel* 6/3/46; *Item No.* 9261

## Hand and Platform Truck

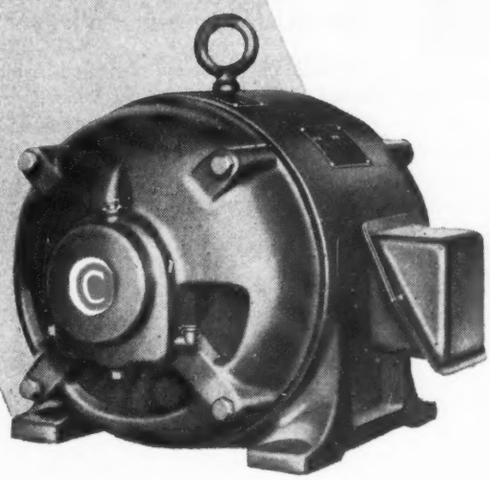
A line of welded all-steel hand trucks with renewable rubber tired ball bearing wheels is announced by Laughlin Mfg. Co., Inc. 5157 S. Halsted street, Chicago. Four models vary in width from 12 to 20 in., having capacities from 500 to 700 lbs. The company also is making steel trucks with a platform measuring 27 x 52 in., with capacity of 1400 lbs. Also having

*(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 142.)*



Century 7½ horsepower type SCH and 3 horsepower type SC motors driving a steel plate forming machine.

# Whatever the Torque Requirement . . . There's a CENTURY MOTOR for the Job . . .



The motor application on the plate forming machine shown above is a good example of Century motors properly applied. There are two separate drives, each having a different power requirement.

The power rolls that force the steel plate through this machine require a motor that starts against a heavy load. A Century type SCH motor with high starting torque and low starting current is used.

The adjustable roll that controls the curvature of the plate requires a standard general purpose Century type SC motor with normal starting torque.

Correct application of these two motors means that the steel plate roller gives top performance and a maximum of output.

If your machines require electric motors from 1/20 to 600 horsepower, investigate Century. Specify Century motors on all your electrically powered equipment. Engineered to the functional characteristics of the machines they drive to assure top performance — Century motors are a vital factor in producing a better product at a lower cost.

Century C MOTORS

476

**CENTURY ELECTRIC COMPANY** • 1806 Pine Street • St. Louis 3, Missouri

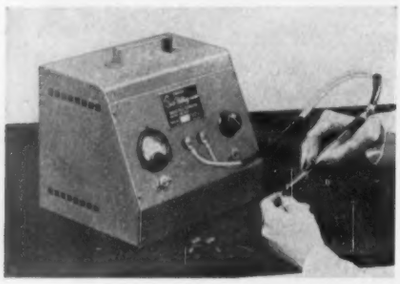
*Offices and Stock Points in Principal Cities*

rubber tires on ball bearing wheels, this truck has swivel casters and detachable steel handle.

*Steel* 6/3/46; *Item No.* 9518

## Spot Welder

Tweezer-Weld Corp., 280 Plane street, Newark, N. J. announces a Besco tweezer spot welding machine for parts 0.0005-in. to ⅛-in round. Weighing only 25 lb, it operates on 115 v, 60-cycle current,



but is adaptable to 220 v. To weld parts larger than 0.015-in. an auxiliary booster unit is required.

A pair of insulated, forged copper tweezers, operated by a foot switch, hold, bend, apply pressure, and then weld the pieces. To apply additional pressure, tweezers may be removed and machine may be connected to a drill press or hand arbor, and copper rods inserted as electrodes, with only bottom electrode being insulated

*Steel* 6/3/46; *Item No.* 9277

## Feathering Pump

Motor-mounted hydraulic pumps are offered by Pesco Products Co., Cleveland, Division of Borg-Warner, for feathering propellers on military aircraft. Weighing 14.4 lb, it has capacity of 4 gpm at pressure of 400 psi, or 3 gpm at 1000 psi.

The pump is designed to operate 2 out of every 15 min at 1000 psi. A bleed hole drilled through the valve seat permits circulation of oil through the pump when it is idling or inoperative.

*Steel* 6/3/46; *Item No.* 9517

## Flame Cutting Outfit

A compact pack type emergency flame cutting outfit, complete with goggles and gloves is announced by Victor Equipment Co., 844 Folsom street, San Fran-

cisco. Housed in an aluminum carrying case containing a spare cylinder and a canvas bag for holding it to operator's back, it is for use where bent or twisted steel makes rescue conditions difficult.

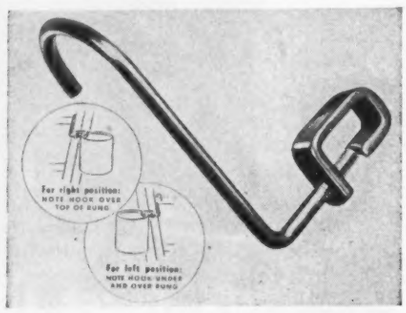
Preset regulators are positioned so that they do not protrude. Cutting torch is held for instant removal in harness. Spark lighter, hose, cutting tips and wrenches are included with the outfit.

*Steel* 6/3/46; *Item No.* 9308

## Paint Can Hooks

New paint hook manufactured by T. G. Persson Co., 224 Glenwood avenue, Bloomfield, N. J., helps prevent spilling of cans and costly accidents.

A simple adjustment permits can to




be hung on right or left side of ladder instantly. For right position hook is slipped over top of rung and for left position hook goes under and over rung.

Two cans may be hung on opposite sides of any ladder—without interference to the painter. Hooks are also suitable for use with most other receptacles.

*Steel* 6/3/46; *Item No.* 9301

## Thread Measuring Wires

A line of Carboloy cemented-carbide thread and gear measuring wires is announced by Lincoln Park Industries, 1719 Ferris avenue, Lincoln Park, Mich. Wires in the line are ground and lapped to standard tolerances closer than National

**FOR MORE INFORMATION** on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

*Circle numbers below corresponding to those of items in which you are interested:*

| | | |
|---|---|---|
| 9514 | 9261 | 9260 |
| 9122 | 9518 | 9245 |
| 9237 | 9277 | 9192 |
| 9248 | 9517 | 9239 |
| 9304 | 9308 | 9241 |
| 9270 | 9301 | 9268 |
| 9181 | 9298 | |

6-3-46

NAME ..... TITLE .....

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*(All claims are those of respective manufacturers; for additional information fill in and return the coupon on this page.)*

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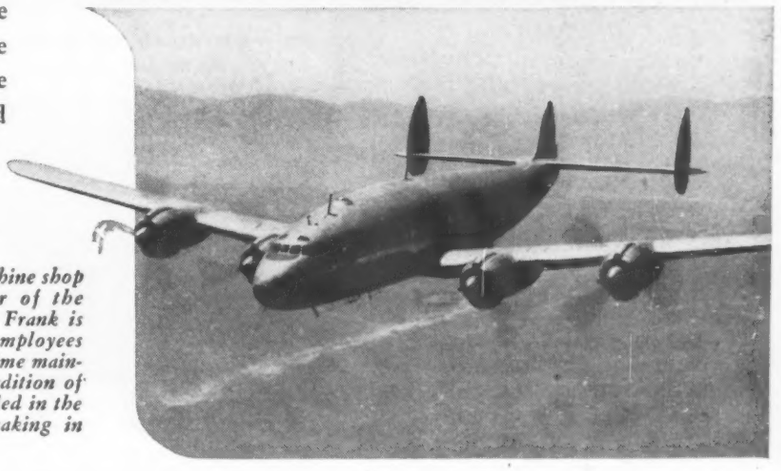
The inherent strength-without-weight advantages of OSTUCO Seamless Steel Tubing are utilized in all U.S.-built aircraft, from pert little single-seaters to massive transports that span the globe in a matter of hours. As wing struts, engine mounts, fuselage framework and in numerous other applications, OSTUCO Tubing is helping to build better, faster, safer aircraft. The engineering ability, experienced craftsmanship*, and rigid adherence to quality manufacture that The Ohio Seamless Tube Company has contributed to many interested industries may be of help to you. Complete information is available from the sales office nearest you. Write today, and ask for your free copy of "M-1", a booklet containing valuable information about steel analyses, tolerances and machining methods.

** This is Frank Irey, machine shop veteran and a member of the OSTUCO 50-Year Club. Frank is one of many skilled employees who have devoted a lifetime maintaining the OSTUCO tradition of quality, a tradition founded in the earliest days of tube making in America.*



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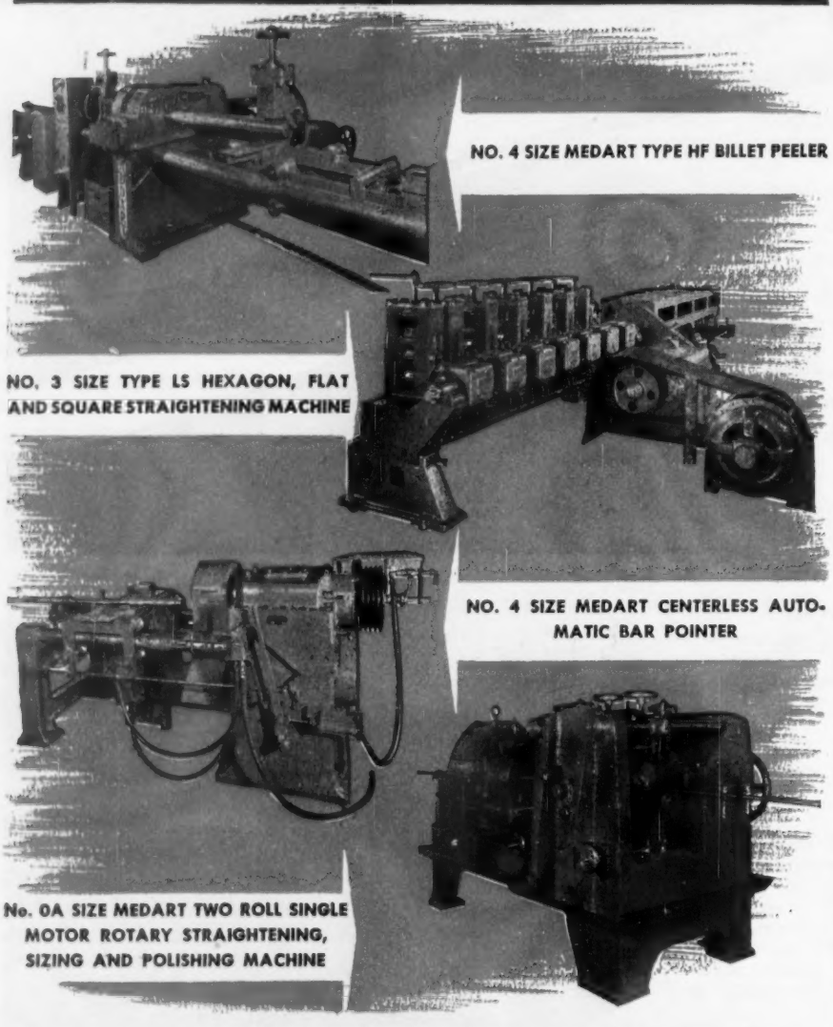

NO. 4 SIZE MEDART TYPE HF BILLET PEELER

NO. 3 SIZE TYPE LS HEXAGON, FLAT AND SQUARE STRAIGHTENING MACHINE

NO. 4 SIZE MEDART CENTERLESS AUTOMATIC BAR POINTER

No. 0A SIZE MEDART TWO ROLL SINGLE MOTOR ROTARY STRAIGHTENING, SIZING AND POLISHING MACHINE

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MEDART

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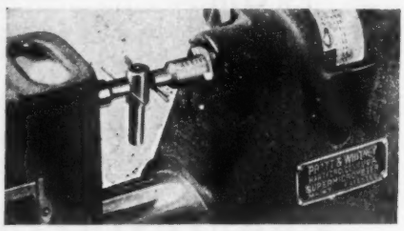
Bureau of Standards specifications. Longer life, greater accuracy and reduced possibility of "flats" developing are advantages claimed.

Wires are supplied in sets of three contained in labeled glass bottles. Wires for



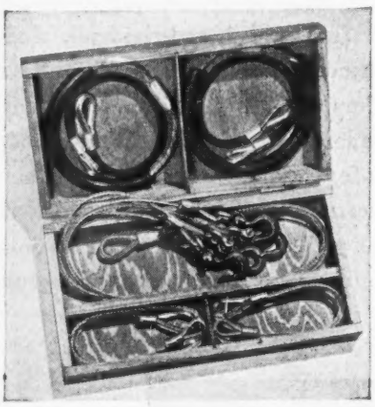
NS 4 to 36 pitch are available from stock, while wires for other pitches, Whitworth, British association, metric, Acme, worm threads and gear wires are supplied on special order.

*Steel* 6/3/46; *Item No.* 9298

## Sling Kits

Sling kits for all ½ and 2-ton load lifting requirements are announced by Wire and Cable Division, Wind Turbine Co., West Chester, Pa.

Called Trylon safety slings, these provide three slings and three types of in-



terchangeable, standard accessories which enable lifting on any job. Slings for choker hitch, bale handling, moving heavy machinery skids or handling numbers of small parts are included.

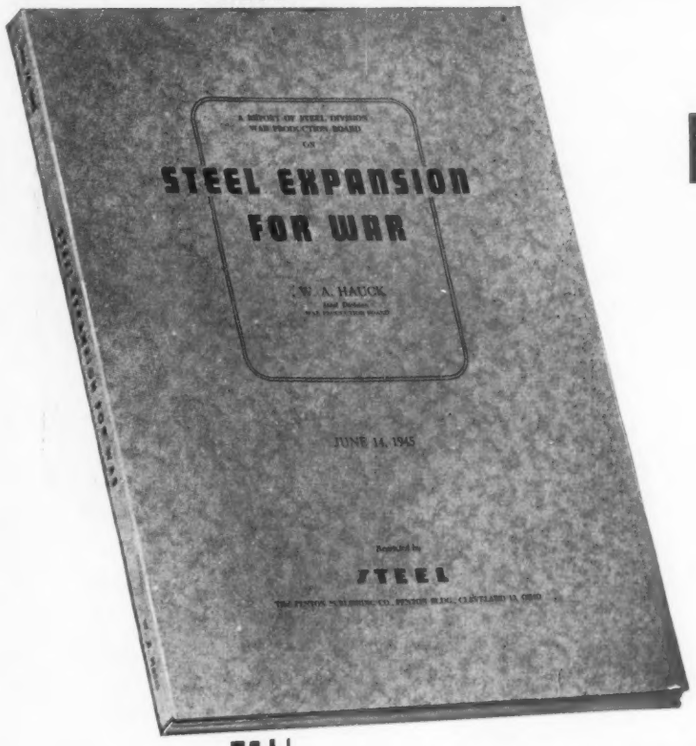
Kits with capacities of 1000 and 2000 lb are available, each being engineered for a safety factor of more than four times the rated load. Slings and connectors are rustless and entirely weatherproof.

*Steel* 6/3/46; *Item No.* 9260

## Fire Extinguisher

Carbon dioxide portable fire extinguishers in a complete range of sizes from 2 to 100 lb are offered by General Detroit Corp., Detroit and General Pacific Corp., Los Angeles. Called CD-Sno Fog, they are recommended for fighting

**Facts and Figures on New and Expanded Facilities of the Steel Industry are now revealed in**




# STEEL EXPANSION FOR WAR

**By W. A. HAUCK**

*An official report by Mr. Hauck for the War Production Board*

THIS 192-page handbook is an official report prepared for the War Production, the Reconstruction Finance Corporation and other government agencies.

Much heretofore unpublished information is presented on new and revamped facilities of hundreds of plants, including those in the ore, ore transportation, coal and coke, refractory, ferro alloy, scrap, foundry and forging industries.

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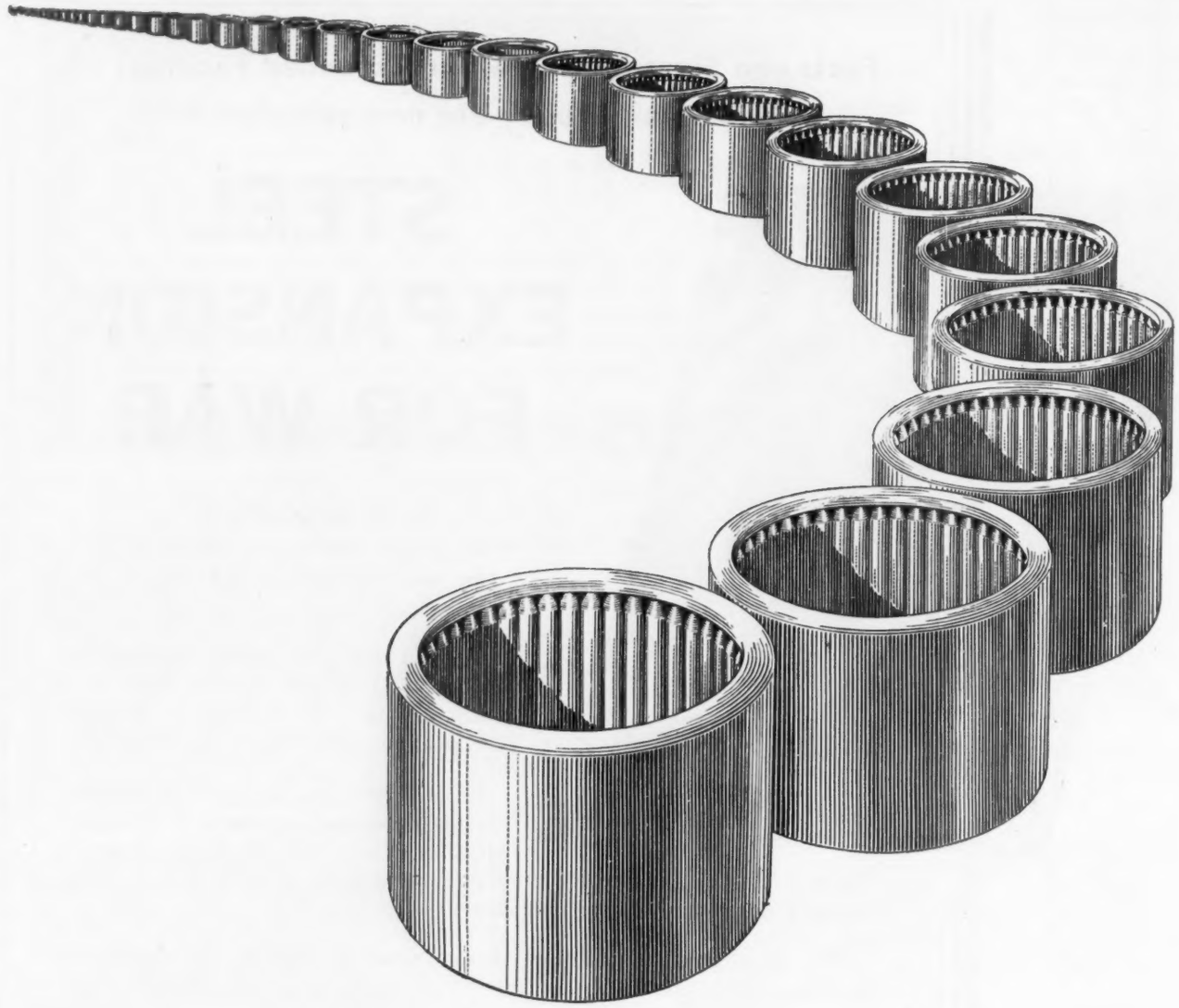

# They're cutting operating costs all along the line

Economy of operation is an inherent feature of Torrington Needle Bearings, and it shows up in the form of measurable cost savings all down the line. . . :

*In power costs* . . . The tremendous radial capacity of Needle Bearings, combined with their low coefficient of friction and equalized load distribution at operating speeds, assures minimum starting and running friction . . . less power consumption.

*In lubrication costs* . . . The close-fitting, turned-in lips of the hardened outer shell form a reservoir to retain the lubricant and distribute it evenly over all of the bearing surfaces. Thus, less frequent lubrication and maintenance are required, and bearing wear is reduced to the vanishing point.

*In servicing or replacement costs* . . . Needle Bearings also contribute marked economies. They never seem to need attention, seldom if ever is a replacement required. This is due directly to their design, high load capacity and efficient lubrication.

In your own industry, compact, low-cost Torrington Needle Bearings have solved innumerable friction problems. Our Catalog 32, copy of which is available upon request, will give you a comprehensive picture of Needle Bearing advantages as applied to the machines *you* design, build or operate.

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## TORRINGTON NEEDLE BEARINGS

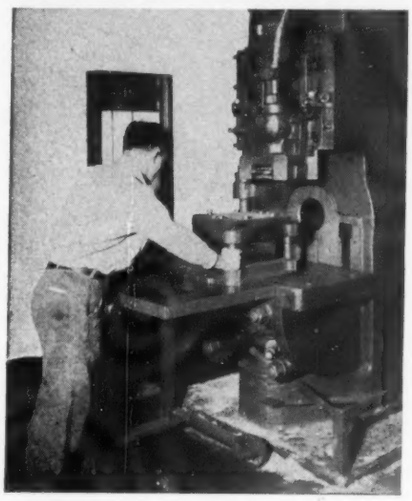
fires in electrical equipment, oil, grease and flammable liquids.

Cylinders of extinguishers are of high-grade steel, with brass fittings. Discharge horns are of shock-resistant plastic construction.

*Steel* 6/3/46; *Item No.* 9245

## Table Top Truck

New features incorporated into the Handy Hoister announced by Lewis-Shepard Products Inc., 245 Walnut street, Watertown, Mass., include steel construction of bracket, backplate and platform, roller-bearing sheave on hardened and

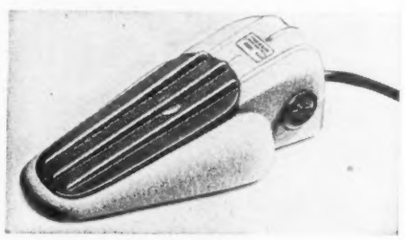


ground shaft, channel type uprights, tubular bracing and base members, and open-end base. Wheels are all roller-bearing mounted and are available in semi-steel, rubber or Celoron. They are available with swivel casters at front or with handle at front.

*Steel* 6/3/46; *Item No.* 9192

## Foot Switch

A new convenient time-saving foot switch with many industrial uses is announced by Industrial Timer Corp., 117 Edison Place, Newark. Called the Time-



O-Light, it controls any motor-driven equipment up to 1 hp.

Operating on alternating current, the switch features a heavy duty snap-action, single pole, double throw switch, using silver contacts. Two outlets, each with 1500 w capacity, operate electrical equip-

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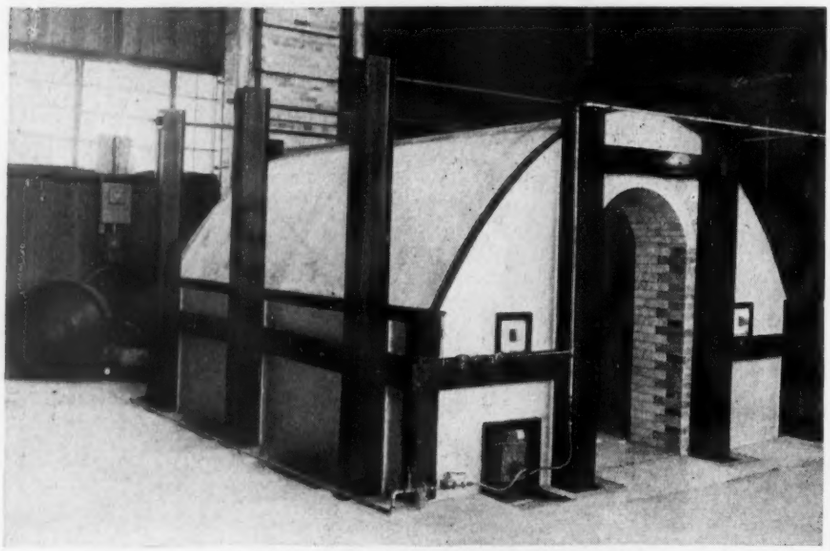
# TWO NEW
## SUPER REFRACTORIES
# FIRED TO CONE 35



Kiln for firing Remmey 99AD & Crystalite A Refractories to Cone 35

**REMMEY 99AD BRAND**
**Over 99% Alumina**

REMMEY 99 AD BRAND made of pure chemically precipitated alumina, without clay bond. Analyzes over 99% Corundum.
Corundum, the Crystalline form of Alumina, is more resistant than any other refractory oxide to many types of slag.
Firing to Cone 35 makes Remmey 99 AD Refractories hard and tough.
Modulus of rupture 2800 lbs. P.S.I.
P.C.E. 42.

**CRYSTALITE A BRAND**
**Recrystallized Mullite**

CRYSTALITE A BRAND is fired to Cone 35 to produce a composition closely approaching an all Crystalline Mullite Body. Due to this Crystalline Structure "Crystalite A" Refractories are highly resistant to glass furnace slags and other destructive slags.
Load test shows zero subsidence at 2950° F. P.C.E. 40.

# REMMEY

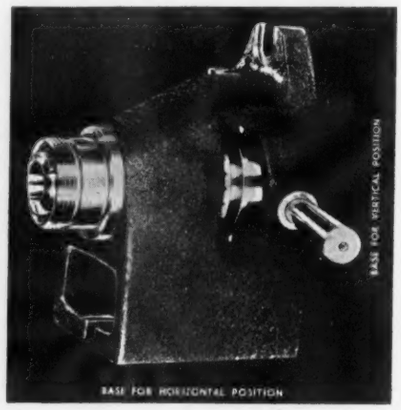
**RICHARD C. REMMEY SON CO., PHILADELPHIA 37, PA.**
*Representatives:* Vitrefrax Corp., Los Angeles 11, Calif., John G. Seanor, Pittsburgh 14, Pa.




ment when pedal is depressed, while one red outlet of 1500 w capacity turns electric off when pedal is depressed.
*Steel* 6/3/46; *Item No.* 9239

## Collet Holding Fixture

Two new collet holding fixtures of large capacity are offered by Hardinge Brothers, Inc., Elmira, N. Y. Designed to fill a need for low cost fixtures, fixture bases are machined to allow their use in either horizontal or vertical po-

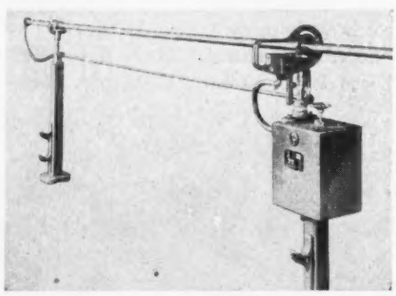



sition. They are designated as model HV-H and model HV-HN.

Both fixtures take collects having capacity of 1-in. round, ⅞-in., ¾-in. square stock. The two are similar in design, except that model HV-HN has a threaded nose spindle to provide interchangeability with jaw chucks and special fixtures.
*Steel* 6/3/46; *Item No.* 9241

## Pneumatic Bar Feed

A pneumatic bar feed claimed to increase screw machine and turret lathe production by an average of 20 per cent is offered in additional sizes and new assembly designs by Lipe-Rollway Corp.,

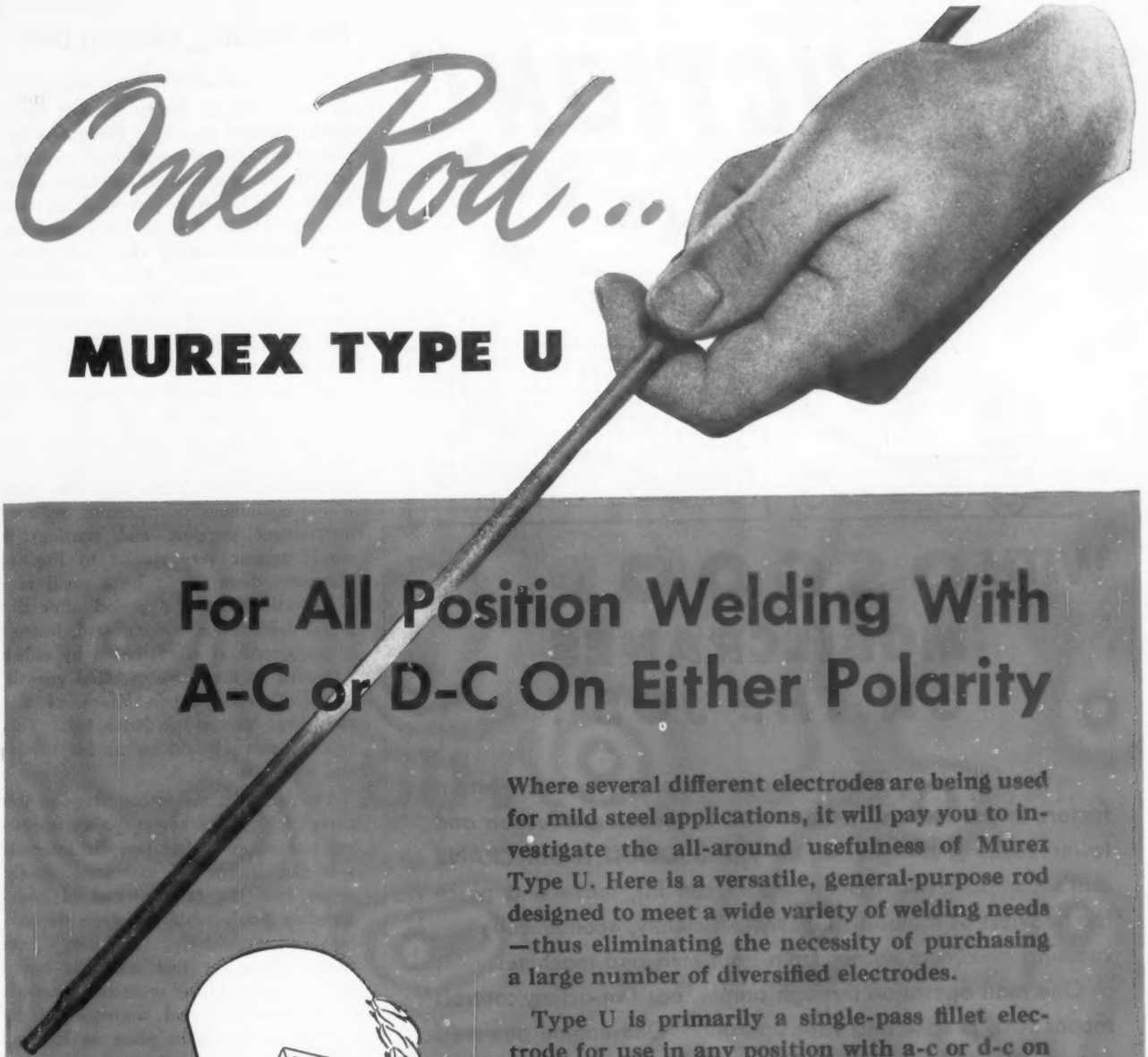


Syracuse, N. Y. Featuring a relocated control cabinet within reach of operator in normal working position, the pedestals of machines utilize a smaller floor space.

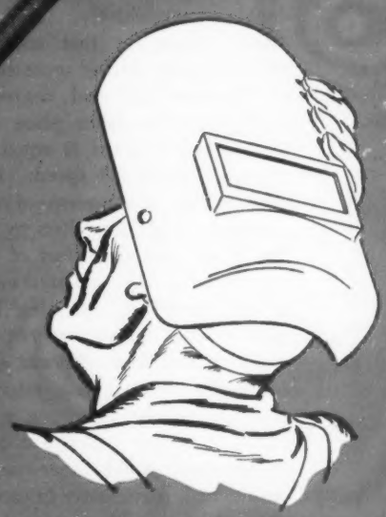
New models available are model 68 for ½-in. diameter, 12 ft capacity, model 100 for ¾-in. diameter, 12 ft capacity and model 500 for 4 in. diameter.
*Steel* 6/3/46; *Item No.* 9268

# One Rod...

## MUREX TYPE U



## For All Position Welding With A-C or D-C On Either Polarity



Where several different electrodes are being used for mild steel applications, it will pay you to investigate the all-around usefulness of Murex Type U. Here is a versatile, general-purpose rod designed to meet a wide variety of welding needs—thus eliminating the necessity of purchasing a large number of diversified electrodes.

Type U is primarily a single-pass fillet electrode for use in any position with a-c or d-c on either polarity. It has excellent welding qualities, simplifies slag removal and deposits clean, sound metal with a tensile strength of 70,000 psi.

Complete information, including procedure, application data and physical properties, is available on request. Write today and see for yourself how this one rod can simplify your welding problems.

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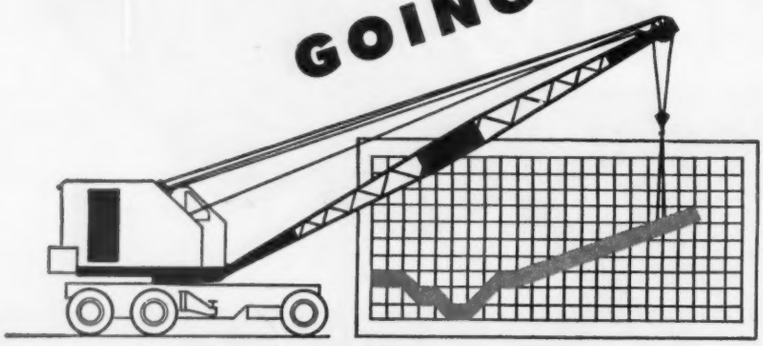

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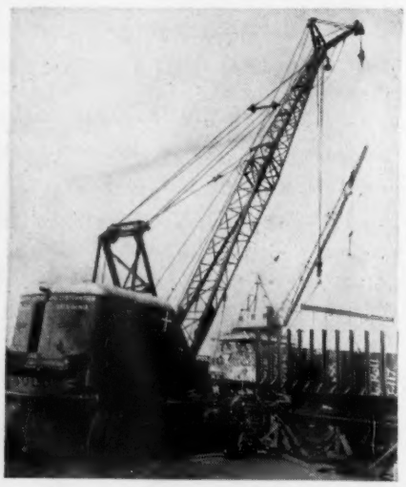

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OSGOOD
SHOVELS, DRAGLINES CRANES
CRAWLER & WHEEL MOUNTS
DIESEL, OIL, GAS, ELECTRIC


## Pre-Stressing Rotating Dies

(*Concluded from Page* 106)

of time. This is due to the fact strain hardening and stretching tendencies approximately balance each other after the large initial deformation has taken place along the favorably oriented crystals. Such a balance may be maintained for many hours, following which one of two things will happen. Either the strain hardening tendency will predominate, causing the rate of growth to decrease, and signifying that the material will be able to withstand the test load indefinitely, or the stretching tendency will suddenly predominate, and the rate of growth will increase rapidly until failure occurs. If growth vs time were plotted for such a steady stress condition (that is for continuous overspeeding without intermittent stopping and starting) it would appear very similar to Fig. 3. However, there would be a small rate of growth during the period after the initial deformation is completed, instead of no growth at all, followed by either flattening of the curve or rapid growth, again depending upon which of the above two factors predominated. This type of curve would be similar to the one shown in Fig. 5.

The fact that the second stage of the curve of Fig. 3—wherein the overspeeding was stopped after periodic intervals —is flat instead of increasing slowly shows that the first interval of overspeeding does actually pre-stress the material compressively, therefore, true tensile stress for that speed is never attained again during successive intervals of overspeeding, and consequently no further growth takes place as long as the operating speed is equal to or less than the overspeed speed. It therefore can be seen that overspeeding not only eliminates the faulty disks to begin with, but it also has the effect of strengthening the good disks and thus enables them to withstand the operating loads more readily than if they had not been oversped. Although the amount of pre-stress is usually retained as a safety factor, it does permit the operating speed to be raised to values which are considerably higher than could otherwise be safely maintained, particularly in cases of emergency where sudden unusual power demands must be met by the engine.

—o—

A new technical bulletin covering hard surfacing and use of Hardex electrodes in building up surfaces for resistance to shock and abrasion is offered by Metal & Thermit Corp., New York. It contains data concerning effect of temperature and cooling rates on deposited metal, selection of proper grade of rod and recommended welding techniques.

**BUT** *OVER 1300* **READY-MADE COMBINATIONS OF HALLOWELL STEEL WORKBENCHES!**

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Fig. 732
Patd. & Pats. Pending
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How does "BBB" differ from "PROOF COIL"?
PROOF COIL CHAIN
"Proof Coil" is often referred to as common coil chain. It is a welded steel chain, suitable for all general use where especially high tensile strength is not required. It is made in 13 sizes from 3/16" to 1¼".
BBB COIL CHAIN
A heavier chain with shorter links for increased flexibility—proof tested to higher loads than Proof Coil. Made in same range of sizes as Proof Coil.
In either of these chains—or any other of the many types of welded and weldless chain—you can take high quality and uniformity for granted when you "Buy American."

## ★★ BUY AMERICAN ★★

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## High-Speed Hardening

(*Concluded from Page* 107)

molten boric acid should, prior to quenching, be allowed to drain from any blind holes in the part being hardened. Work can also be air cooled, in which case the salt film protects the part against scaling while cooling. The boric acid which adheres to the part solidifies upon cooling, and can be easily removed with hot water.

Full hardness without scaling can be obtained. This method is not particularly well adapted to production hardening of high speed steel, but in the absence of modern atmosphere equipment, it will serve nicely.

## $200,000 Award Program By Lincoln Foundation

Further scientific progress in arc welding is encouraged by a $200,000 award program announced by The James F. Lincoln Arc Welding Foundation, Cleveland. Designed to tap every possible source for ideas on arc welding, competition is open not only to scientists and engineers, but to all persons connected with industry, research or education.

Awards ranging from $100 each for honorable mention to the principal prize of $13,200 will be given for papers covering every field of application and research for electric arc welding. Subjects include redesign of an existing machine, structure or fabricated product; research work applied to arc welding; successful operation of all phases of weldery and maintenance.

Program closes in one year, at midnight June 1, 1947. Rules and conditions governing entry may be obtained from the foundation secretary, Cleveland 1.

## New Fast-Drying Enamel Has Wide Range of Uses

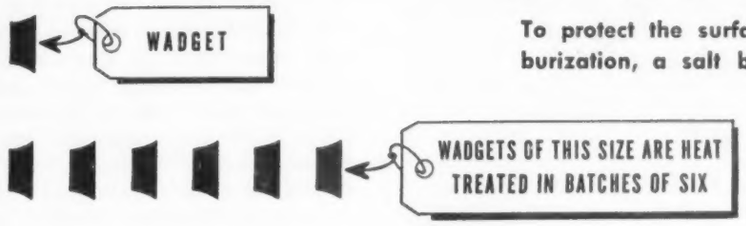
A new, fast-drying baking enamel has been developed by the H. V. Walker Co., Elizabeth, N. J., to meet the need for faster production in all industries using organic finishes. Called Porciflex, this new paint, when applied to metal gives a flexible porcelain-like finish which has a high resistance to acids, alkalis, oils and greases.

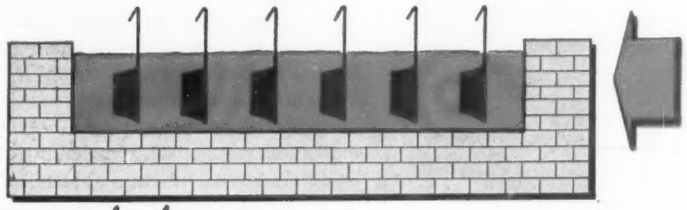
The enamel may be applied by spray, roller-coating machine, or dip. It is baked at schedules from 1 min at 450° for sheet metal to 15 min at 275° for other types of work. It is also well adapted to infra-red baking, according to the company.

This fast drying enamel is said to be a suitable finish for kitchen and medical cabinets, refrigerators, and other metal products.

# HOW TO HEAT TREAT A WADGET* AT LOWEST COST

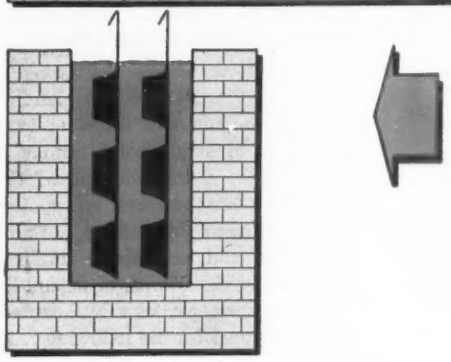
**To protect the surface, avoid distortion, eliminate decarburization, a salt bath furnace will, of course, be used**



If you get a *conventional* salt bath furnace it looks somewhat like this . . . and the Wadgets are placed like this.

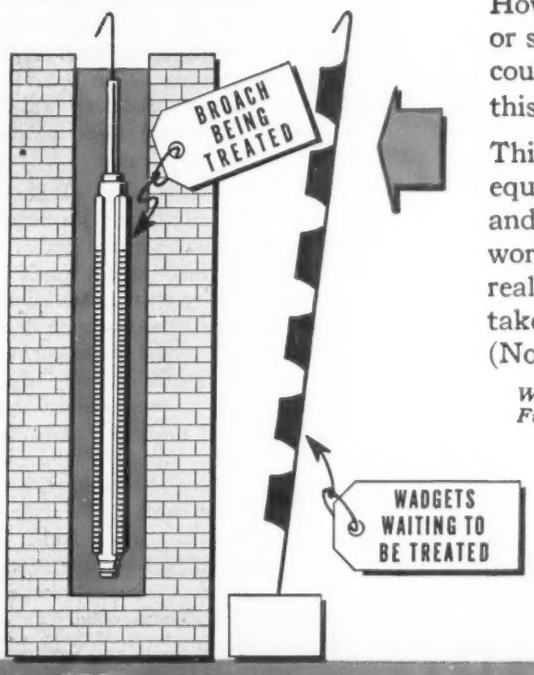
*Note the surface area exposed†*



If you have an *Upton* Electric Salt Bath Furnace it would probably look like this . . . with the Wadgets being placed like this.

*Note surface area exposed†*

*†Surface radiation losses equal 15 KW per sq. ft. per hour.*




However, if you also wanted to treat a broach or some similar long piece of work, then you could use an Upton Furnace that looked like this.

This saves more heat (and more power), does equally good work, takes less time loading and unloading, but some people think it won't work; that it's too deep. So, until they do realize that Upton Furnaces can be built to take any length work, the other furnace (No. 2) is usually supplied.

*Why don't you send for more information on Upton Furnaces? Send us the dimensions of your Wadgets.*

* Wadget: A piece of work that you are wondering how to treat for better results and at lower cost than at present which will eventually be heat treated in an Upton Electric Salt Bath Furnace because there is no known size or shape that cannot conceivably be treated in an Upton Electric Salt Bath Furnace

**Upton ELECTRIC FURNACE DIV.**

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**All of the above Steels in Chrome-Nickel Types**

( ) Free Manual of Welding and Fabricating Procedures for IngAclad


## Diamonds As Cutting Tools

(*Continued from Page* 111)

and those of almost black variety—are considered to be the hardest. Chips obtained in the preparation of diamond jewels likewise are classified as bort.

Diamonds occur in nature as crystallized carbon of structure known as "face-centered cubic". Because their perfect crystalline structure is in the ultimate state of orientation, diamonds possess unusual properties including: Very low compressibility; high modulus of elasticity; extreme resistance to abrasion; great breaking strength; rapid heat conductivity; high melting point; and chemical inertness. As a class, the diamond is the hardest substance known to man, but there are, however, noticeable variations in properties between and even with individual stones. This probably is due to differences in structure although there is as yet no scientific proof as to the nature or degree of this variation.

Primarily, diamonds are being used to machine materials too hard, too tough or too abrasive for steel tools to cope with; as single point turning, boring, facing tools (see illustration) to obtain mirror-like surfaces on nonferrous metals through high-speed, of infeed machining; and as tools to finish work to extremely close limits of fit and finish. Diamonds are particularly adapted to these objectives for the following reasons: They are extremely hard and wear resistant and at the same time they are capable of attaining polished surfaces comparable to those of an optical flat. They can be given and long will hold sharply defined cutting edges, under difficult working conditions.

Today, diamond cutting tools are confined to work only on certain materials and certain jobs. The authors of this article believe that through further investigation of the proper orientation of the cutting facets or faces of diamonds with respect to their crystal planes eventually will permit diamond machining of a far greater variety of metals, possibly even to machining of many of the hardened steels. Properly shaped diamond cutting tools such as those shown on p. 111 do not "smear" the workpiece surface crystals in the boundary zone. Rather, they cut right through their granular structure. Thus, they produce smooth, precise surfaces free of amorphous metal. This condition is especially desirable in babbitt and bronze bearings and other close fitting parts which rotate or slide one on the other. Such diamond machining will obviate "running in" parts.

Rough diamonds with natural edges sometimes can be utilized as cutting tools. However, lapped-to-shape stones generally are much to be preferred.

The vital surfaces usually are ground and polished by means of cast iron laps impregnated with diamond dust—"diamond cut diamond" as the old saying puts it.

Either cold setting or hot setting of the diamond tip in the steel shank of the tool can be employed, as long as firm diamond-to-metal seating is obtained without damage to the stone itself. Cutting edges with rake angles between 5° positive and 5° negative most commonly are used. As a matter of "economics", diamonds are used only as finishing tools, following roughing cuts usually taken with cemented carbide. Typical diamond cutting operations involve light chip loads (0.0008 to 0.003-in.), shallow depth of cut (0.006-in. or less), and high cutting speeds (600 to 1000 fpm).

If satisfactory performance is to be assured when using diamond tools, machines having no vibration and no "play" in bearings and slides are an absolute must. Support of tool shanks should be as close to the diamond as possible and the shank itself should give support as close as possible below the actual cutting edge of the diamond itself. With suitable machine tools and correct setup—including provisions for getting the chips away from the cutting edges—diamond tools should have extremely long service life.

Under such conditions, careless handling rather than actual tool wear is apt to be the real cause of failure. The best insurance against careless handling is proper "briefing" of setup men and operators by instructors who know diamonds.

## Grinding Lesson Movies Offered by Norton

Seven motion pictures in color comprise a series entitled "Lessons in Grinding" being offered by Norton Co., Worcester, Mass., for use by apprentice and vocational schools, colleges and industrial societies.

Covering types of grinders, applications and grinding wheel useage, these 16-mm films run from 14 to 30 min each. All are loaned without charge by the publicity department of the company.

## Victor Publishes Book on Welding Industry History

A booklet depicting uses of flame from the practices of the Stone Age down to the amazing cutting and joining machines of today is available from Victor Equipment Co., San Francisco. Written in a readable style, it contains many illustrations of welding applications, equipment and uses.

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## Powder Metal Parts

(*Continued from Page* 110)

posed by their inherent porosity, which permits absorption of any liquid or salts present in the plating solution. Particularly in the case of iron powder parts, this must be guarded against, since it results in internal corrosion and consequent structural weakness in the part.

Special processes and special Durex iron mixes have been developed for applications demanding increased wear-resistance, hardness, elastic properties, corrosion-resistance, etc. Porosity and self-lubrication can be retained in most instances, and strength qualities in structural parts, gears and cams are improved.

As stated before, briquetting is the crux of the powder in metallurgy process. It is worth going into detail, because the practicability of producing a metal powder part is largely determined by whether the part can be briquetted to a satisfactory density. If a designer understands the limitations of the briquetting process, he can design parts accordingly and take full advantage of the savings that powder metallurgy has to offer.

Practically every design limitation stems from a combination of the three fundamental limitations of the briquetting process:

(1) **Lack of Plastic Flow in Powders Under Pressure**—Powders do not tend to flow from a region of high compression to a region of lower compression. Sharp corners and angles in the die cell that do not "fill" completely before pressure is applied will be lower in density after pressure is applied, resulting in structural weakness. By the same token, parts which involve large dimensional variations in thickness, parallel to the direction of pressure, present serious problems in maintaining uniform density throughout the piece.

(2) **Friction of Powders on Sides of Die Barrel and Punch**—The friction of powders on the sides of the die barrel is considerable, and influences the rate of compression along the axis of briquetting. Parts compressed from the top are less dense at the bottom, because of frictional loss; parts compressed from top and bottom are less dense in the middle. And the greater the ratio of length to diameter and/or wall thickness, the more care that must be exercised to obtain satisfactory uniformity in density.

(3) **Mechanical Limitations of Tools and Dies**—Pressures are most economically applied from top and bottom, not from the sides. This

imposes certain limitations on shapes. Parts with re-entrant angles, grooves around the periphery, or complex surface configurations on a plane perpendicular to the axis of briquetting, cannot be produced without secondary machining operations. Another mechanical limitation is that certain shapes require dies of weak design, and must be modified to eliminate feather-edges, very small pins or narrow and deep splines on the die punch.

With these fundamental limitations in mind, the briquetting process can be examined to determine how various shapes are achieved, and then examples of impractical and practical designs can be considered.

**Briquetting Methods For Obtaining Axial Variations in Length:** In this category any part can be included which possesses variations in its over-all length in the direction of briquetting, whether caused by axial projections, by slots, grooves, blind holes and recesses, or by wings. The term length is used to indicate not the larger dimension, but the dimension that is parallel to the briquetting motion.

As a general rule, parts involving axial variations of less than one-fourth their length are "naturals" for briquetting. The reason for this is that, in such parts, the ratio of compression and resulting density will be sufficiently uniform without the mechanical compensation of multiple punches.

In the examples of the briquetting process that follow, a compression ratio of 3 to 1, and an arbitrary method of explaining the problems of briquetting in terms of "unit strokes" of compression have been used. This is an over-simplified method, but illustrates the point.

Whether the variation in axial length takes the form of a projection or a recess, briquetting can be accomplished by a single upper punch if the variation is less than one-fourth the over-all dimension.

| | |
|---|---|
| Axial size over-all | 8 units |
| Axial size under recess | 7 units |
| Variation in axial size (variation, less than ¼) | 1 unit |

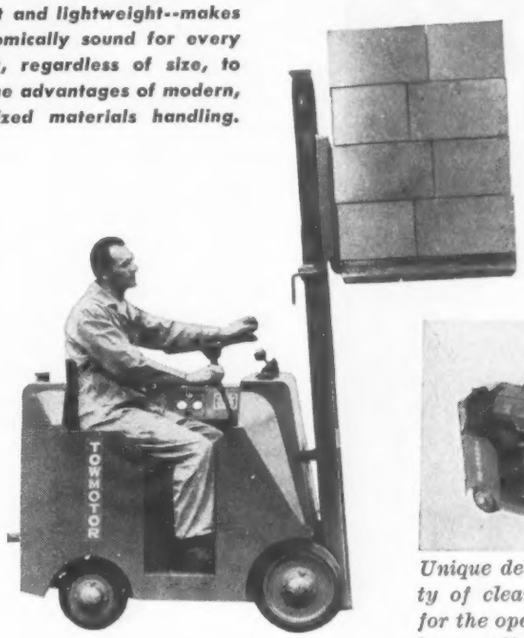
In Fig. 5 the powder fill is approximately 23 units—a compromise between the 24 units theoretically required for the over-all dimension (24 to 8) and the 21 units required for the dimension under recess (21 to 7). After the briquetting stroke, the compression ratio of the over-all length is 23 to 8, or 2.9 to 1. Compression ratio of body under recess is 23 to 7, or 3.3 to 1. The final densities of the body under recess and of the over-all length satisfactorily approach the ideal ratio of 3 to 1 for all practical purposes. Still further uniformity can be effected by sizing.

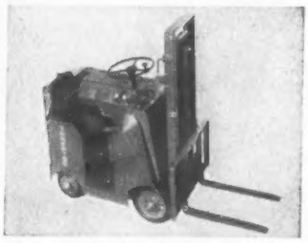
Flanged or winged parts involving a


*Announcing . . .*

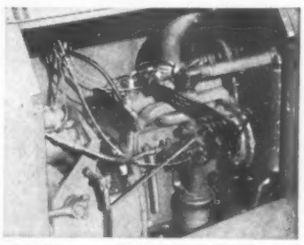
**The New TOWMOTOR LT-35 LIFT TRUCK**

***Compact and lightweight--makes it economically sound for every industry, regardless of size, to enjoy the advantages of modern, mechanized materials handling.***



*Unique design provides plenty of clear, accessible space for the operator while retaining small overall dimensions and low center of gravity for maximum stability.*



*Engine and transmission in the LT-35 are easily accessible for inspection, adjustment and maintenance.*

The new Towmotor LT-35 Lift Truck can lift, carry and stack 1500 to 2000 pound loads with ease, yet it is so compact and lightweight that it may, with utmost safety, be operated under full load on freight elevators of limited capacity, on upper floor levels where low load limits are imposed, or directly into motor trucks.

Because of its size and ability to operate in confined areas, the LT-35 makes it economically sound to provide mechanical handling on jobs where manual handling, with its excessive labor costs, was formerly the only available method. The small, agile LT-35 can save time, money and manpower on your operation by taking over countless handling tasks, accomplishing them in less time, with far less effort and at lower cost.

The new LT-35 is the smallest of the complete line of Towmotor Lift Trucks and Tractors, each a product of the experience and "know-how" that Towmotor has gained in solving handling problems in every industry. Send for your copy of the Towmotor Lift Truck ANALYSIS GUIDE today. Towmotor Corporation, 1223 East 152nd Street, Cleveland 10, Ohio.

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- ★ LOW STEP UP TO OPERATOR'S STATION
- ★ LIGHTWEIGHT
- ★ RUGGED CONSTRUCTION
- ★ MANEUVERABLE
- ★ 4-WHEEL STABILITY
- ★ AMPLE SPACE FOR OPERATOR
- ★ EASY REACH CONTROLS
- ★ HYDRAULIC LIFTING AND TILTING MECHANISMS
- ★ MAXIMUM ACCESSIBILITY FOR INSPECTION AND MAINTENANCE
- ★ SHORT TURNING RADIUS
- ★ ENGINEERED TO THE JOB BY TOWMOTOR

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variation of more than one-fourth the length of the body are produced quite simply by compensating for the difference in length, and the consequent difference in the briquetting stroke required to effect a 3-to-1 compression, by briquetting from both the top and the bottom. As the upper punch descends to effect compression on the flanged end of the bearing, the lower punch rises to compress the body. For example:

| | |
|---|---|
| Axial size over-all | 4 units |
| Axial size of flange | 1 unit |
| Variation axial sizes | 3 units |

(Difference, more than ¼)

As Fig. 2 illustrates, the flanged portion of the die cell is constructed to accommodate 3 unit-lengths of powder to form the flange, while the body cell is built to accommodate 9 additional unit-lengths. To accomplish compression of the over-all length from 12 units to 4 units, 8 units of compression are required. Thus, the upper punch descends 2 units to compress the flange, and the bottom punch travels up 6 units to compress the body under the flange.

Often it is possible to briquette a part by two movements, but an extra stripper punch is necessary to eject the part from the die without breakage. This applies to parts with extra-wide flanges or projections.

| | |
|---|---|
| Axial size over-all | 4 units |
| Axial size of flange | 1 unit |
| Variation axial size | 3 units |

As in briquetting the flanged cylinder of the preceding illustration, the die cell of Fig. 3 accommodates 12 units of powder for the over-all dimension—3 for flange, and 9 for the portion of the body below the flange. As in the preceding illustration, the upper punch descends 2 units to compress the flange, while the bottom punch travels up 6 units to compress the body under the flange. However, because of the extreme width of the flange, a stripper punch must be provided under the flange to help eject the part after briquetting.

The practicability of briquetting parts which involve several variations in axial dimensions—such as a part with a double step—as shown in Fig. 1, depends on many factors in the relation of the dimensions to each other. In some cases they can be briquetted satisfactorily by two briquetting movements. In others, an additional movement is required from the bottom to compensate for the variation in dimensions. And in still others, it is most economical to combine briquetting with a turning operation to attain the desired shape.

| | |
|---|---|
| Axial size over-all | 8 units |
| Axial size of large OD | 5 units |
| Axial size of second OD | 1 unit |
| Axial size of small OD | 2 units |
| Fill over 1st flange | 15 units |
| Fill over 2nd flange | 16 units |
| Fill over-all | 22 units |

The upper punch of Fig. 1 descends 10 units, and the bottom punch travels up 4 units. Thus the compression ratio of the over-all dimension is 22 to 8, which is satisfactory. In traveling down 10 units, the upper punch compresses the 15-unit fill over the first flange to 5 units (ideal), and the 16-unit fill over the second flange to 6 units (2.7 to 1). Actually, this last ratio is improved, because the small variation in the OD's of the steps permits considerable powder flow.

If the length of the second flange were greater in relation to the length of the first flange (largest OD), it would not be possible to obtain satisfactory density over the second flange by the method shown. (The stroke of the upper punch is limited by the length of the first flange). Likewise, if the difference in diameters between the flanges were greater, this method would be impracticable because there would be insufficient flow of powder to compensate for uneven densities. In either of the above cases, the part may be (1) briquetted with one flange and the second step put in by turning operation, or (2) briquetted by adding an additional movement from the bottom.

Since pressure is applied axially, radial projections or contours that do not entail variation in axial length (as opposed to flanges and wings that do entail such variations) can be compacted without involving new factors in the briquetting process. Gears, cams and parts with various projections or recessions are formed by mating the design of the die cell and punch in the required shape.

When parts of this nature are being designed, three limitations should be kept in mind: (1) It is difficult to obtain complete fill in narrow die recesses; (2) tools for briquetting narrow splines will necessarily be weak in design; (3) radial configurations increase the surface area in contact with the sides of the die barrel and consequently make it more difficult to retain even density through the part. Because of these limitations, it is desirable to avoid deep and narrow splines whenever possible in designing parts to be produced economically by powder metallurgy.

**Holes and Hollow Cylinders:** Holes parallel to the axis of briquetting are formed by means of a core rod which extends to the top of the die cell and is mated to corresponding holes in the upper and lower punch during the briquetting stroke.

Consideration of the briquetting method in producing holes makes it apparent that keyways may be formed simply by the contour of the core rod, and that square or other-shaped holes are also feasible. Parts requiring tapered holes or counter-bores can be produced by machining the core rod. In producing

tapered holes, a short length of the hole must be straight cylindrical to accommodate the upper punch.

(1) Holes which are not parallel to the axis of briquetting cannot be briquetted.

(2) Threaded surfaces cannot be briquetted, since they present the problem of re-entrant angles.

**Limitations on Wall Thickness:** In general practice, a minimum wall thickness of 0.050-in. is recommended for bearings up to ¾-in. in diameter, and increases proportionately thereafter. The limitation on large and abrupt changes in cross-sectional area is based not so much on briquetting difficulty as on the problem it raises in sintering. Dimensional changes during sintering in thin and thick wall sections are not uniform and may cause considerable warpage.

There are certain characteristics of metal powder parts which do not affect major design, but should be noted and observed: (1) A minimum of 0.010-in. radius should be allowed on all inside corners, such as under a flange, as this facilitates briquetting and increases tool life; (2) chamfers should be provided at corners and edges to eliminate objectionable burrs; (3) a little land is required where the tapered part begins and the tool stops, in order to avoid a feather-edge on the tool; (4) on spherical bearings a minimum flat of 3/32-in. on the OD increases tool life and makes for more economical production.

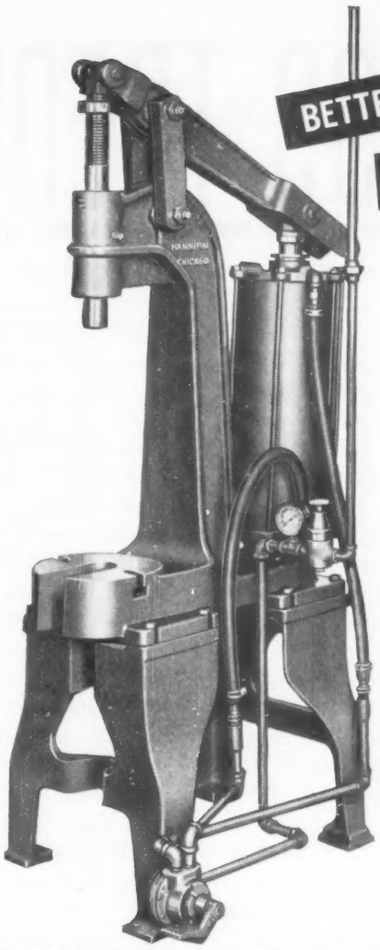
## New Bushings Reduce Danger of Seizure

A new line of rustproof aluminum bronze guide post bushings that reportedly can be fitted closely without danger of seizure is now in production by Ampco Metal Inc., Milwaukee. Made centrifugally of Grade 18 Ampco metal, they are said to be of exceptional strength, being well adapted for plastic molding dies.

Bushings are being offered in standard sizes, in long and short shoulder and standard die set types. Inside diameters from 0.7519 to 3.500 in. are available.

## New Salt Tablet Prevents After Effects

Developed to combat fatigue from excessive heat, a new salt tablet with a patented coating said to prevent dissolving before it reaches the upper, or small intestine is offered by U. S. Safety Service Co., 1215 McGee street, Kansas City, Mo. Called Pep-Up, this tablet prevents nausea and workers experience no ill effects after taking them, the maker states, as a high concentration of salt is delivered without dissolution in stomach.

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Hannifin pneumatic Arbor Presses provide for fast, efficient production on many types of press-assembly, molding, straightening, bending, forming, and similar operations. The pressure required for any individual operation may be readily adjusted, and either foot pedal or hand operated valve provides simple, accurate control. Operator fatigue is avoided and uniform production can be consistently maintained.

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# the BUSINESS TREND

TURBULENCE on the labor front continued to make increasingly deeper cuts into the nation's industrial activity during the week ended May 25 with the result that STEEL's industrial production index registered 95 per cent (preliminary), lowest since the steel strike early this year. At 95 per cent, the index was 11 points below the mark of the previous week.

Biggest factor in the latest decline was curtailment of railroad car loadings during the railroad strike in the latter part of the week ended May 25. Held back by a fuel shortage resulting from the coal miners' strike, steel ingot production has been at a low level several weeks, and practically all industry is feeling the effect of this choking down of the flow of steel.

**AUTOS**—Amid all the turbulence and uncertainties in the week ended May 25, the automobile industry made a slight gain in production. Total number of passenger cars, trucks, and busses produced that week was 53,020, compared with 48,565 in the previous week and 71,355 in the week ended May 11.

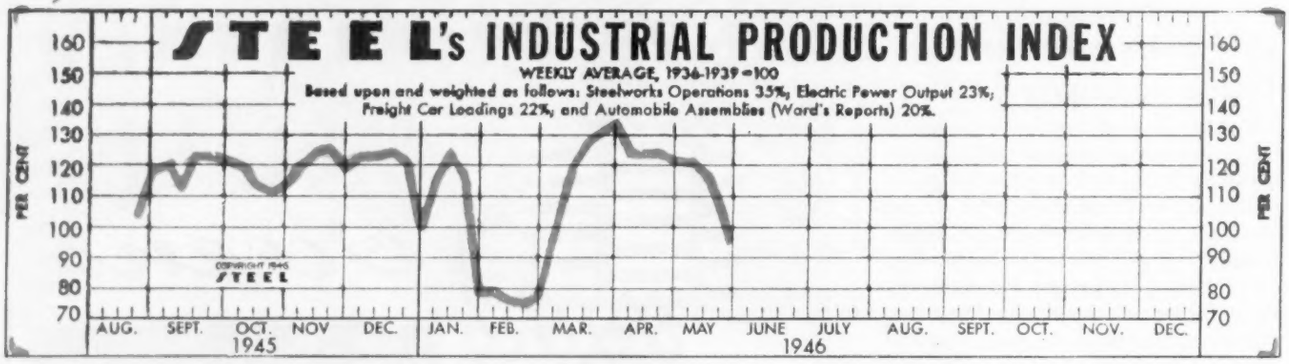
**COAL**—First week of the two-week truce in the bituminous coal miners' strike saw soft coal production jump to 9,300,000 tons. In the previous week, output was only 470,000 tons. Reflecting effects of the strike of bituminous coal miners, soft coal production from Jan. 1 through May 18 totaled only 173,840,000 tons, a drop of 53,651,000 tons, or 23.6 per cent, from that of the corresponding period of 1945.

**CONSTRUCTION**—A new monthly peak for this year was set by construction contracts awarded in April in the 37 states east of the Rocky mountains. Total of contracts awarded was $734,911,000. Previous high had been $697,593,000 in Mareh.

**STRUCTURAL STEEL**—Meanwhile, however, estimated total bookings of 115,987 tons of fabricated structural steel for April were the lowest for any month up to that point in 1946 but were 5 per cent above the average April bookings for the five prewar years, 1936-1940. Although April shipments of 110,420 tons were the highest for this year, they were 10 per cent less than the April average for 1936-1940.

**MACHINE TOOLS**—Total shipments of machine tools in April have been estimated at $28,100,000, up slightly over the March figure of $27,326,000. Unfilled orders at the end of April totaled $180,300,000, a new high for this year. Previous high was $178,140,000 in January.

**RAILROAD FREIGHT**—Volume of freight traffic handled by Class I railroads during April totaled 40 billion ton miles, 35 per cent under the corresponding month last year, due in part to stoppage in bituminous coal production. Also, the April, 1946, traffic was lighter than in any of the preceding three months this year.




**The Index (see chart above):** **Latest Week (preliminary) 95** **Previous Week 106** **Month Ago 121**

## FIGURES THIS WEEK

| INDUSTRY | Latest Period* | Prior Week | Month Ago | Year Ago |
|---|---|---|---|---|
| Steel Ingot Output (per cent of capacity)§ | 43 | 49 | 70 | 93.5 |
| Electric Power Distributed (million kilowatt hours) | 3913.0† | 3,939 | 3,977 | 4,330 |
| Bituminous Coal Production (daily av.—1000 tons) | 1,550 | 77 | 118 | 1,872 |
| Petroleum Production (daily av.—1000 bbls.) | 4,700† | 4,731 | 4,672 | 4,867 |
| Construction Volume (ENR—Unit $1,000,000) | $104.2 | $137.8 | $131.6 | $35.0 |
| Automobile and Truck Output (Ward's—number units) | 53,020 | 48,565 | 64,620 | 21,010 |

*Dates on request. §1946 weekly capacity is 1,762,381 net tons. 1945 weekly capacity was 1,831,636 net tons.
†Preliminary.

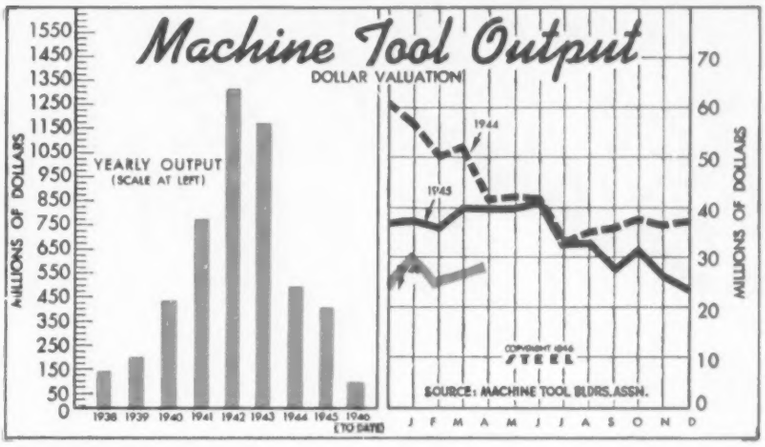
| TRADE | | | | |
|---|---|---|---|---|
| Freight Carloadings (unit—1000 cars) | 393† | 688 | 660 | 882 |
| Business Failures (Dun & Bradstreet, number) | 20† | 16 | 17 | 12 |
| Money in Circulation (in millions of dollars)‡ | $27,961 | $27,950 | $27,877 | $26,399 |
| Department Store Sales (change from like wk. a yr. ago)‡ | +38% | +40% | +51% | +1% |

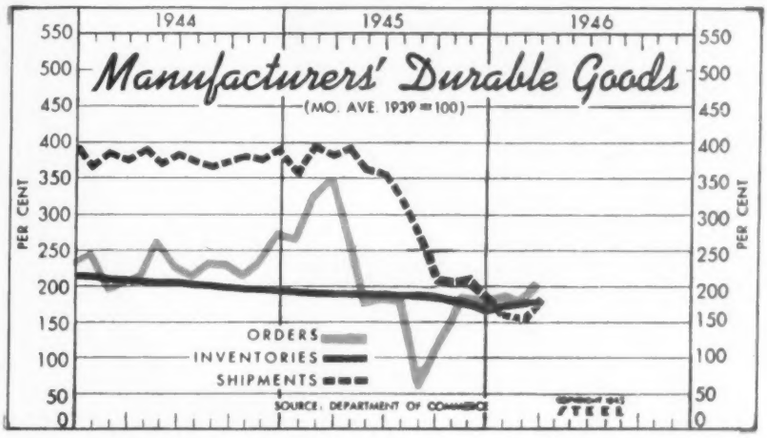
†Preliminary. ‡Federal Reserve Board.

### Machine Tool Shipments

(000 omitted)

| | 1946 | 1945 | 1944 | 1943 |
|---|---|---|---|---|
| Jan. | $30,263 | $37,353 | $56,363 | $117,384 |
| Feb. | 26,949 | 36,018 | 50,138 | 114,594 |
| Mar. | 27,326 | 40,015 | 51,907 | 125,443 |
| Apr. | 28,100 | 40,170 | 41,370 | 118,024 |
| May | ..... | 39,825 | 41,819 | 113,859 |
| June | ..... | 41,040 | 41,471 | 108,736 |
| July | ..... | 32,304 | 32,753 | 97,541 |
| Aug. | ..... | 32,500 | 33,177 | 87,805 |
| Sept. | ..... | 27,300 | 33,889 | 85,842 |
| Oct. | ..... | 31,200 | 37,516 | 78,302 |
| Nov. | ..... | 26,000 | 36,277 | 71,811 |
| Dec. | ..... | 23,200 | 36,784 | 60,873 |
| Total | ..... | $407,155 | $497,464 | $1,180,216 |


Machine Tool Output
DOLLAR VALUATION
YEARLY OUTPUT
(SCALE AT LEFT)
1944
1945
MILLIONS OF DOLLARS
1938 1939 1940 1941 1942 1943 1944 1945 1946 (TO DATE)
J F M A M J J A S O N D
SOURCE: MACHINE TOOL BLDRS. ASSN.
COPYRIGHT 1946 STEEL



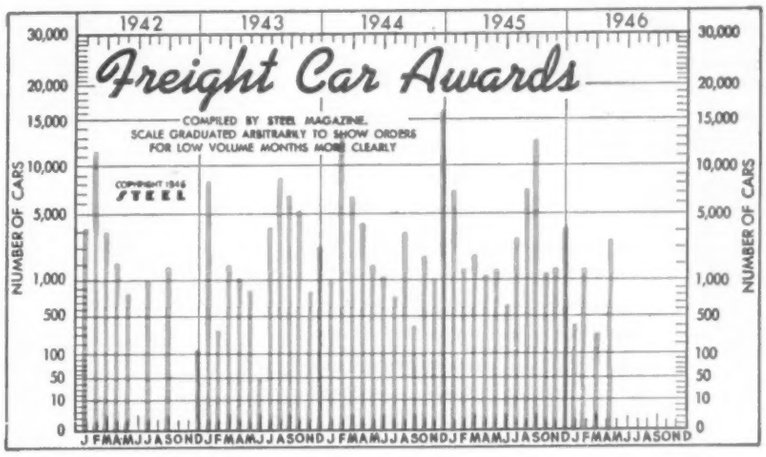

### Index of Manufacturers' Durable Goods

(Mo. Ave. 1939 = 100)

| | Orders | | Shipments | | Inventories | |
|---|---|---|---|---|---|---|
| | 1946 | 1945 | 1946 | 1945 | 1946 | 1945 |
| January | 180 | 267 | 166 | 354 | 172 | 190 |
| February | 182 | 326 | 152 | 394 | 174 | 189 |
| March | 203 | 351 | 180 | 382 | 178 | 189 |
| April | ... | 267 | ... | 389 | ... | 189 |
| May | ... | 177 | ... | 361 | ... | 189 |
| June | ... | 182 | ... | 356 | ... | 189 |
| July | ... | 179 | ... | 320 | ... | 187 |
| August | ... | 53 | ... | 262 | ... | 185 |
| September | ... | 121 | ... | 216 | ... | 185 |
| October | ... | 160 | ... | 203 | ... | 182 |
| November | ... | 171 | ... | 200 | ... | 177 |
| December | ... | 172 | ... | 199 | ... | 171 |
| Average | ... | 202 | ... | 303 | ... | 185 |

### Freight Car Awards

| | 1946 | 1945 | 1944 | 1943 |
|---|---|---|---|---|
| Jan. | 420 | 7,200 | 1,020 | 8,365 |
| Feb. | 1,795 | 1,750 | 13,240 | 350 |
| Mar. | 300 | 2,300 | 6,510 | 1,935 |
| Apr. | 3,405 | 1,120 | 4,519 | 1,000 |
| May | .... | 1,526 | 1,952 | 870 |
| June | .... | 670 | 1,150 | 50 |
| July | .... | 3,500 | 795 | 4,190 |
| Aug. | .... | 7,240 | 3,900 | 8,747 |
| Sept. | .... | 12,810 | 400 | 6,820 |
| Oct. | .... | 1,320 | 2,425 | 5,258 |
| Nov. | .... | 1,630 | 1,065 | 870 |
| Dec. | .... | 4,116 | 16,245 | 2,919 |
| Total | .... | 45,432 | 53,221 | 41,374 |


1942
1943
1944
1945
1946
Freight Car Awards
COMPILED BY STEEL MAGAZINE.
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
NUMBER OF CARS
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
COPYRIGHT 1946 STEEL

## FINANCE

| | Latest Period* | Prior Week | Month Ago | Year Ago |
|---|---|---|---|---|
| Bank Clearings (Dun & Bradstreet—millions) | $11,807 | $11,289 | $11,371 | $11,109 |
| Federal Gross Debt (billions) | $273.0 | $273.0 | $274.3 | $238.2 |
| Bond Volume, NYSE (millions) | $19.7 | $18.7 | $29.8 | $13.6 |
| Stocks Sales, NYSE (thousands) | 6,338 | 5,947 | 7,282 | 6,407 |
| Loans and Investments (billions)† | $64.1 | $64.1 | $63.5 | $57.2 |
| United States Gov't. Obligations Held (millions)† | $45,871 | $45,777 | $47,050 | $42,833 |

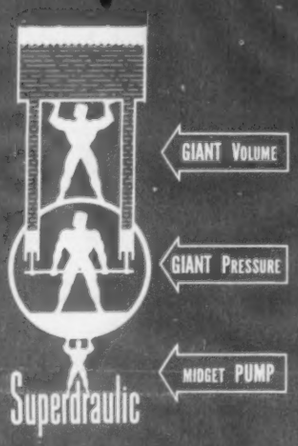
†Member banks, Federal Reserve System.

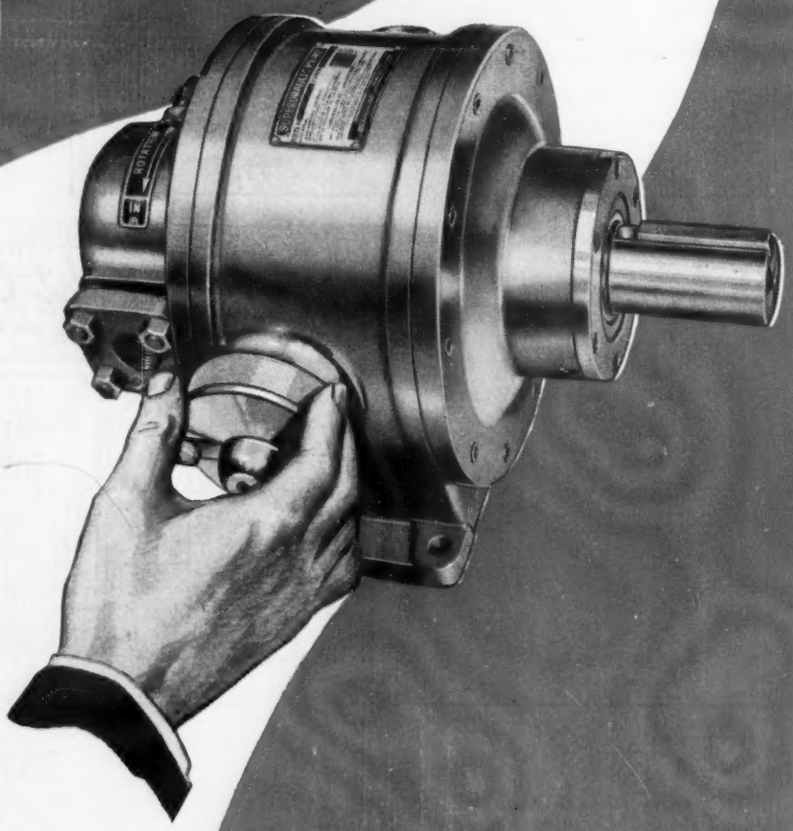
## PRICES

| | | | | |
|---|---|---|---|---|
| STEEL's composite finished steel price average | $63.54 | $63.54 | $63.54 | $58.27 |
| All Commodities† | 110.9 | 110.1 | 109.6 | 103.8 |
| Industrial Raw Materials† | 124.6 | 123.2 | 123.0 | 117.9 |
| Manufactured Products† | 106.1 | 105.6 | 105.1 | 102.1 |

†Bureau of Labor Statistics Index, 1926=100.

# Superdraulic Finger Volume Control



Turn the dial with a touch of your fingers and control volume as easily and conveniently—and precisely—as tuning a radio set! That's an important factor in modern hydraulically operated machines which demand highly sensitive control of speeds and pressures.

In addition, Superdraulic gives you giant volume and giant pressure in a midget pump—so light and compact that it can be handled easily by one man. This pump develops 5,000 psi and 40 hp in continuous service, delivering 0 to 17 gpm at 1,200 rpm. It is available in both constant and variable delivery models. The basic principle of the Superdraulic pump is adaptable to hydraulic pumps, motors, and transmissions for every purpose.

Illustrated literature showing details of construction and operation will be gladly furnished.

## Superdraulic Corporation

HYDRAULIC PUMPS • MOTORS • TRANSMISSIONS • VALVES

MILLER AT FORD ROAD • DEARBORN, MICHIGAN

# MARKET SUMMARY

## Much Time Required To Reach Normal Steel Output

***Raw materials shortages will persist for many weeks . . . Mills sold far into future on most major items***

WHILE resumption of soft coal mining will be reflected in sharp increases in steel production during the ensuing two or three weeks a much longer time will be required for return to normal. In some quarters it is believed at least six to seven weeks will be required, with a further period for steel producers to catch up on lost tonnage.

Producers now are behind schedule eight to 12 weeks on commitments and in some cases even further. Due to efforts to maintain production as far as possible on sheets, strip and tin plate these products are in relatively better position than most other major items. This difference is impressive because of the particularly strong demand for light flat products.

On the other hand arrearages on small hot-rolled carbon bars are heaviest of all, as production has not been as well sustained and demand has been especially active, only a shade less than for light flat items. Plate producers are behind two or three months on an average, with some expecting a carryover of more than three months at the end of this quarter.

A tight situation has developed in wire and wire products. Supply of wire rods has shrunk, partly with the general reduction in steel output and partly because of price considerations. The latter have caused some nonintegrated wiremakers to be almost cut off from supplies. Because of price control some producers of wire are limiting shipments to areas and products which offer best profit. Reduction of production in many lines of wire is having its effect on various civilian manufacturing industries, including automotive, furniture and bedding manufacturers. In some cases entirely different grades are being accepted to maintain consumers operations.

Effects of Civilian Production Administration control of building has not affected industrial construction as much as had been feared, a majority of projects being certified and only a small portion rejected. Shape mills are well supplied with orders and best deliveries for most material is December on current acceptances. Much public work is coming out and considerable of this is withdrawn after bids, as costs run considerably higher than estimates and appropriations.

### DISTRICT STEEL RATES

(Percentage of Ingot Capacity Engaged in Leading Districts)

| | Week Ended June 1 | Change | Same Week 1945 | Same Week 1944 |
|---|---|---|---|---|
| Pittsburgh | 26 | —3 | 90.5 | 93 |
| Chicago | 57.5 | +1.5 | 97 | 101.5 |
| Eastern Pa. | 34 | —3 | 92 | 94 |
| Youngstown | 13 | None | 80 | 96 |
| Wheeling | 53 | —15.5 | 89.5 | 101 |
| Cleveland | 61 | —18 | 91 | 91.5 |
| Buffalo | 63 | +28 | 90.5 | 90.5 |
| Birmingham | 44 | None | 90 | 95 |
| New England | 60 | —7 | 90 | 90 |
| Cincinnati | 82 | —2 | 84 | 87 |
| St. Louis | 49.5 | None | 75 | 74.5 |
| Detroit | 79 | +4 | 83 | 89 |
| Estimated natural rate | 43 | —2 | 91.5 | 98.5 |

Based on weekly steelmaking capacities of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Estimated national rate of ingot production last week was 43 per cent of capacity, a drop of 2 points from the prior week. Impending settlement of the soft coal strike tended to allow use of such fuel as was available, to a greater degree than previously. Chicago gained 1½ points to 57½ per cent, Buffalo 28 points to 63 and Detroit 4 points to 79 from a revised rate of 75 the preceding week. Pittsburgh declined 3 points to 26 per cent, Wheeling 15½ points to 53, Cleveland 18 points to 61, Cincinnati 2 points to 82, eastern Pennsylvania 3 points to 34 and New England 7 points to 60. Other rates were unchanged, Youngstown 13, St. Louis 49½ and Birmingham 44.

Raw materials supplies impose the greatest deterrent on steelmaking, coke, pig iron and scrap, and these shortages are likely to continue for a long time under best conditions over the next few months. There simply is not sufficient scrap in the country and shortage of steel for fabricators limits production of industrial scrap. Consumers are seeking all tonnages possible, paying high freight charges for remote supplies. Though melt is much reduced demand is high, reflecting the effort to build reserves. Coke shortage has cut so deeply into pig iron production that supply is being spread thinly over the field in an effort to keep as many as possible busy. This lack of iron also adds to efforts to obtain scrap instead. Under no combination of circumstances can it be imagined these shortages will not continue for some time before anything like normal can be attained. Meanwhile, many foundries and other plants are closed for lack of materials, some applying the idle period to early vacations.

Average composite prices of steel and iron products are unchanged, governed by Office of Price Administration ceilings. Finished steel composite is $63.54, semifinished steel $40.60, steelmaking pig iron $25.50 and steelmaking scrap $19.17.

# COMPOSITE MARKET AVERAGES

| | June 1 | May 25 | May 18 | One Month Ago May, 1946 | Three Months Ago March, 1946 | One Year Ago June, 1945 | Five Years Ago June, 1941 |
|---|---|---|---|---|---|---|---|
| Finished Steel | $63.54 | $63.54 | $63.54 | $63.54 | $63.54 | $58.27 | $56.73 |
| Semifinished Steel | 40.60 | 40.60 | 40.60 | 40.60 | 40.60 | 37.80 | 36.00 |
| Steelmaking Pig Iron | 25.50 | 25.50 | 25.50 | 25.50 | 25.125 | 24.00 | 23.00 |
| Steelmaking Scrap | 19.17 | 19.17 | 19.17 | 19.17 | 19.17 | 19.07 | 19.17 |

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

# COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material and Wire Rods, cents per lb; coke, dollars per net ton; others dollars per gross ton.

## Finished Material

| | June 1, 1946 | May, 1946 | Mar., 1946 | June, 1945 |
|---|---|---|---|---|
| Steel bars, Pittsburgh | 2.50c | 2.50c | 2.50c | 2.25c |
| Steel bars, Philadelphia | 2.82 | 2.82 | 2.82 | 2.57 |
| Steel bars, Chicago | 2.50 | 2.50 | 2.50 | 2.25 |
| Shapes, Pittsburgh | 2.35 | 2.35 | 2.35 | 2.10 |
| Shapes, Philadelphia | 2.465 | 2.465 | 2.465 | 2.215 |
| Shapes, Chicago | 2.35 | 2.35 | 2.35 | 2.10 |
| Plates, Pittsburgh | 2.50 | 2.50 | 2.50 | 2.25 |
| Plates, Philadelphia | 2.55 | 2.55 | 2.55 | 2.30 |
| Plates, Chicago | 2.50 | 2.50 | 2.50 | 2.25 |
| Sheets, hot-rolled, Pittsburgh | 2.425 | 2.425 | 2.425 | 2.20 |
| Sheets, cold-rolled, Pittsburgh | 3.275 | 3.275 | 3.275 | 3.05 |
| Sheets, No. 24 galv., Pittsburgh | 4.05 | 4.05 | 4.05 | 3.70 |
| Sheets, hot-rolled, Gary | 2.425 | 2.425 | 2.425 | 2.20 |
| Sheets, cold-rolled, Gary | 3.275 | 3.275 | 3.275 | 3.05 |
| Sheets, No. 24 galv., Gary | 4.05 | 4.05 | 4.05 | 3.70 |
| Hot-rolled strip, over 6 to 12-in., Pitts. | 2.35 | 2.35 | 2.35 | 2.10 |
| Cold-rolled strip, Pittsburgh | 3.05 | 3.05 | 3.05 | 2.80 |
| Bright basic, bess. wire, Pittsburgh | 3.05 | 3.05 | 3.05 | 2.75 |
| Wire nails, Pittsburgh | 3.25 | 3.25 | 3.25 | 2.90 |
| Tin plate, per base box, Pittsburgh | $5.25 | $5.25 | $5.25 | $5.00 |

## Semifinished Material

| | | | | |
|---|---|---|---|---|
| Sheet bars, Pittsburgh, Chicago | $38.00 | $38.00 | $38.00 | $36.00 |
| Slabs, Pittsburgh, Chicago | 39.00 | 39.00 | 39.00 | 36.00 |
| Rerolling billets, Pittsburgh | 39.00 | 39.00 | 39.00 | 36.00 |
| Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts. | 2.30c | 2.30c | 2.30c | 2.15c |

## Pig Iron

| | June 1, 1946 | May, 1946 | Mar., 1946 | June, 1945 |
|---|---|---|---|---|
| Bessemer del. Pittsburgh | $27.69 | $27.69 | $27.315 | $26.19 |
| Basic, Valley | 26.00 | 26.00 | 25.625 | 24.50 |
| Basic, eastern del. Philadelphia | 27.84 | 27.84 | 27.465 | 26.34 |
| No. 2 fdry., del. Pgh. N. & S. sides | 27.19 | 27.19 | 26.815 | 25.69 |
| No. 2 foundry, Chicago | 26.50 | 26.50 | 26.125 | 25.00 |
| Southern No. 2, Birmingham | 22.88 | 22.88 | 22.505 | 21.38 |
| Southern No. 2 del. Cincinnati | 26.94 | 26.94 | 26.565 | 25.44 |
| No. 2 fdry., del. Philadelphia | 28.34 | 28.34 | 27.965 | 26.84 |
| Malleable, Valley | 26.50 | 26.50 | 26.125 | 25.00 |
| Malleable, Chicago | 26.50 | 26.50 | 26.125 | 25.00 |
| Charcoal, low phos., fob Lyles, Tenn. | 33.00 | 33.00 | 33.000 | 33.00 |
| Gray forge, del. Pittsburgh | 26.69 | 26.69 | 26.315 | 25.19 |
| Ferromanganese, del. Pittsburgh | 140.00 | 140.00 | 140.000 | 140.33 |

## Scrap

| | | | | |
|---|---|---|---|---|
| Heavy melting steel, No. 1, Pittsburgh | $20.00 | $20.00 | $20.00 | $20.00 |
| Heavy melt. steel, No. 2, E. Pa. | 18.75 | 18.75 | 18.75 | 18.45 |
| Heavy melting steel, Chicago | 18.75 | 18.75 | 18.75 | 18.75 |
| Rails for rolling, Chicago | 22.25 | 22.25 | 22.25 | 22.25 |
| No. 1 cast, Chicago | 20.00 | 20.00 | 20.00 | 20.00 |

## Coke

| | | | | |
|---|---|---|---|---|
| Connellsville, furnace ovens | $7.50 | $7.50 | $7.50 | $7.50 |
| Connellsville, foundry ovens | 8.25 | 8.25 | 8.25 | 8.25 |
| Chicago, by-product fdry., del. | 13.75 | 13.75 | 13.75 | 13.35 |

## STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA schedules, except those for stainless steels which are now exempt from price control. Price schedule No. 6 covers semifinished and finished iron and steel products; by-product foundry coke, No. 29; relaying rails, No. 46; beehive oven coke, No. 77; bolts, nuts and rivets, No. 147; coke by-products, GMPR, except sulphate of ammonia, No. 205. Finished steel quoted in cents per pound and semifinished steel in dollars per gross ton, except as otherwise noted. Pricing on rails was changed to net ton basis as of Feb. 15, 1946.

### Semifinished Steel

**Carbon Steel Ingots:** Fob mill base, rerolling quality, standard analysis, $33.

**Alloy Steel Ingots:** Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $46.80.

**Rerolling Billets, Blooms, Slabs:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $39; Detroit, del., $41; Duluth (billets), $41; Pac. ports (billets), $51. (Andrews Steel Co., carbon slabs, $41; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co. $58.64, Pac. ports.)

**Forging Quality Blooms, Slabs, Billets:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $47; Detroit, del., $49; Duluth, billets, $49; forging billets fob Pac. ports, $59.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 fob Toronto, O.; Geneva Steel Co. $64.64, Pacific ports.)

**Alloy Billets, Slabs, Blooms:** Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $56.16; del. Detroit $58.16; eastern Mich. $59.16.

**Sheet Bars:** Pittsburgh, Chicago, Cleveland Buffalo, Canton, Sparrows Point, Youngstown, $38. (Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, fob mill.)

**Skelp:** Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb, 2.05c.

**Wire Rods:** Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—$\frac{9}{32}$ in. inclusive, per 100 lb, $2.30. Do., over $\frac{9}{32}$—$\frac{47}{64}$-in., incl., $2.45; Galveston, base, $2.40 and $2.55, respectively. Worcester add $0.10; Pacific ports $0.50.

### Bars

**Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.:** Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.50c; Duluth, base, 2.60c; Detroit, del., 2.60c; eastern Mich., 2.65c; New York, del., 2.84c; Phila., del., 2.82c; Gulf ports, dock, 2.85c; Pac. ports, dock, 3.15c. (Sheffield Steel Corp., 2.75c, fob St. Louis; Joslyn Mfg. & Supply Co., may quote 2.55c, fob Chicago.)

**Rail Steel Bars:** Same prices as for hot-rolled carbon bars except base is 5 tons.

**Hot-Rolled Alloy Bars:** Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.81c; Detroit, del., 2.91c. (Texas Steel Co. may use Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

| AISI Series | (*Basic O-H) | AISI Series | (*Basic O-H) |
|---|---|---|---|
| 1300 | $0.104 | 4300 | $1.768 |
| 2300 | 1.768 | 4600 | 1.248 |
| 2500 | 2.652 | 4800 | 2.236 |
| 3000 | 0.52 | 5100 | 0.364 |
| 3100 | 0.884 | 5130 or 5152 | 0.468 |
| 3200 | 1.404 | 6120 or 6152 | 0.988 |
| 3400 | 3.328 | 6145 or 6150 | 1.248 |
| 4000 | 0.468 | 8612 | 0.676 |
| 4100 (.15-.25 Mo) | 0.728 | 8720 | 0.728 |
| (.20-.30 Mo) | 0.78 | 9830 | 1.352 |

*Add 0.25 for acid open-hearth; 0.50 electric.

**Cold-Finished Carbon Bars:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c.

**Cold-Finished Alloy Bars:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.48c; Detroit, del., 3.58c; eastern Mich., 3.63c.

**Reinforcing Bars (New Billet):** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, 2.50c; Gulf ports, dock, 2.70c; Pacific ports, dock, 2.75c.

**Reinforcing Bars (Rail Steel):** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, del., 2.50c; Gulf ports, dock, 2.70c.

**Iron Bars:** Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Terre Haute, single ref., 5.42c; double ref., 6.76c.

### Sheets, Strip

**Hot-Rolled Sheets:** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base, 2.425c; Granite City, base, 2.525c; Detroit, del., 2.525c; eastern Mich., del., 2.575c; Phila., del., 2.595c; New York, del., 2.665c; Pacific ports, 2.975c. (Andrews Steel Co. may quote hot-rolled sheets for shipment to the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.60c on hot carbon sheets, nearest eastern basing point.)

**Cold-Rolled Sheets:** Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite City, base, 3.375c; Detroit, del., 3.375c; eastern Mich., del., 3.425c; New York, del., 3.615c; Phila., del., 3.595c; Pacific ports, 3.925c.

**Galvanized Sheets, No. 24:** Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 4.05c; Granite City, base, 4.15c; New York, del., 4.29c; Phila., del., 4.22c; Pacific ports, 4.60c.

**Corrugated Galv. Sheets:** Pittsburgh, Chicago, Gary, Birmingham, 29-gage, per square, 3.73c.

**Culvert Sheets:** Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corrugated, copper alloy, 4.15c; Granite City, 4.25c; Pacific ports, 4.60c; copper iron, 4.50c; pure iron, 4.50c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.60c.

**Aluminized Sheets, 20 gage:** Pittsburgh, hot-dipped, coils or cut to lengths, 9.00c.

**Enameling Sheets:** 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.20c; Granite City, base 3.30c; Detroit, del., 3.30c; eastern Mich., 3.35c; Pacific ports, 3.85c.
20-gage: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.80c; Detroit, del., 3.90c; eastern Mich., 3.95c; Pacific ports, 4.45c.

**Electrical Sheets No. 24:**

| | Pittsburgh Base | Pacific Ports | Granite City |
|---|---|---|---|
| Field grade | 3.90c | 4.65c | 4.00c |
| Armature | 4.25c | 5.00c | 4.35c |
| Electrical | 4.75c | 5.50c | 4.85c |
| Motor | 5.425c | 6.175c | 5.525c |
| Dynamo | 6.125c | 6.875c | 6.225c |
| Transformer | | | |
| 72 | 6.625c | 7.375c | ..... |
| 65 | 7.625c | 8.375c | ..... |
| 58 | 8.125c | 8.875c | ..... |
| 52 | 8.925c | 9.675c | ..... |

**Hot-Rolled Strip:** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, 6-in. and narrower: Base, 2.45c; Detroit, del., 2.55c; eastern Mich., del., 2.60c; Pacific ports, 3.10c. (Superior Steel Corp. may quote 3.30c, Pitts.)
Over 6-in.: Base, 2.35c; Detroit, del., 2.45c; eastern Mich.,, del., 2.50c; Pacific ports, 3.00c. (Superior Steel Corp. may quote 3.20c, Pitts.)
**Cold-Rolled Strip:** Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less, 3.05c; Chicago, base, 3.15c; Detroit, del., 3.15c; eastern Mich., del., 3.20c; Worcester, base, 3.25c. (Superior Steel Corp. may quote 4.70c, Pitts.)
**Cold-Finished Spring Steel:** Pittsburgh, Cleveland base, 0.26-0.50 carbon, 3.05c. Add 0.20c for Worcester.

## Tin, Terne Plate

(OPA ceiling prices announced March 1, 1946.)
**Tin Plate:** Pittsburgh, Chicago, Gary, 100-lb base box, $5.25; Granite City, Birmingham, Sparrows Point, $5.35.
**Electrolytic Tin Plate:** Pittsburgh, Gary, 100-lb base box, 0.25 lb tin, $4.60; 0.50 lb tin, $4.75; 0.75 lb tin, $4.90; Granite City, Birmingham, Sparrows Point, $4.70, $4.85, $5.00, respectively.
**Tin Mill Black Plate:** Pittsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pacific ports, boxed, 4.30c.
**Long Ternes:** Pittsburgh, Chicago, Gary, No. 24 unassorted, 4.05c; Pacific ports, 4.80c.
**Manufacturing Ternes (Special Coated):** Pittsburgh, Chicago, Gary, 100-base box, $4.55; Granite City, Birmingham, Sparrows Point, $4.65.
**Roofing Ternes:** Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb $12.50; 20-lb $15.50 (nom.); 40-lb $20.00 (nom.).

## Plates

**Carbon Steel Plates:** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.50c; New York, del., 2.69c; Phila., del., 2.55c; St. Louis, 2.74c; Boston, del., 2.82-3.07c; Pacific ports, 3.05c; Gulf ports, 2.85c.
(Granite City Steel Co. may quote carbon plates 2.65c fob D.P.C. mill; Geneva Steel Co., Provo, Utah, 3.20c fob Pac. ports; Central Iron & Steel Co., Harrisburg, Pa., 2.80c, basing points; Lukens Steel Co., Coatesville, Pa., 2.75c, base; Worth Steel Co., Claymont, Del., 2.60c, base; Alan Wood Steel Co., Conshohocken, Pa., 2.75c, base)
**Floor Plates:** Pittsburgh, Chicago, 3.75c; Pacific ports, 4.40c; Gulf ports, 4.10c.
**Open-Hearth Alloy Plates:** Pittsburgh, Chicago, Coatesville, 3.75c; Gulf ports, 4.20c; Pacific ports, 4.40c.
**Clad Steel Plates:** Coatesville, 10% cladding: nickel-clad, 18.72c; inconel-clad, 26.00c; monel-clad, 24.96c.

## Shapes

**Structural Shapes:** Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.35c; New York, del., 2.52c; Phila., del., 2.465c; Pacific ports, 3.00c; Gulf ports, 2.70c.
(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.60c, Bethlehem, Pa., on the general range and 2.70c on beams and channels from 4 to 10 inches.)
**Steel Piling:** Pittsburgh, Chicago, Buffalo, 2.65c; Pacific ports, 3.20c.

## Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham, per 100 pounds)

| | |
|---|---|
| **Wire to Manufacturers in carloads** | |
| Bright basic or bessemer | *$3.05 |
| Spring (except Birmingham) | *$4.00 |
| **Wire Products to Trade** | |
| **Nails and staples** | |
| Standard and cement-coated | †$3.25 |
| Galvanized | ††$2.90 |
| **Wire, Merchant Quality** | |
| Annealed | §$3.50 |
| Galvanized | §$3.85 |
| (Fob Pittsburgh, Chicago, Cleveland, Birmingham, per base column) | |
| **Woven fence,** 15½ gage and heavier | 72 |
| **Barbed wire,** 80-rod spool | 79 |
| **Barbless wire,** twisted | 79 |
| **Fence posts** | 74 |
| **Bale ties,** single loop | 72½ |

*Add $0.10 for Worcester, $0.05 for Duluth and $0.50 for Pacific ports.
†Add $0.30 for Worcester, $0.50 for Pacific ports.
††Add $0.50 for Pacific ports.
§Add $0.10 for Worcester, $0.70 for Pacific ports.

## Tubular Goods

**Welded Pipe:** Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

**Butt Weld**

| In. | Steel Blk. | Steel Galv. | In. | Iron Blk. | Iron Galv. |
|---|---|---|---|---|---|
| ⅛ | 53 | 30 | ½ | 21 | 0½ |
| ¼ & ⅜ | 56 | 37½ | ¾ | 27 | 7 |
| ½ | 60½ | 48 | 1-1¼ | 31 | 13 |
| ⅝ | 63½ | 52 | 1½ | 35 | 15½ |
| 1-3 | 65½ | 54½ | 2 | 34½ | 15 |

**Lap Weld**

| In. | Steel Blk. | Steel Galv. | In. | Iron Blk. | Iron Galv. |
|---|---|---|---|---|---|
| 2 | 58 | 46½ | 1¼ | 20 | 0½ |
| 2½-3 | 61 | 49½ | 1½ | 25½ | 7 |
| 3½-6 | 63 | 51½ | 2 | 27½ | 9 |
| 7-8 | 62 | 49½ | 2½-3½ | 28½ | 11½ |
| 9-10 | 61½ | 49 | 4 | 30½ | 15 |
| 11-12 | 60½ | 48 | 4½-8 | 29½ | 14 |
| | | | 9-12 | 25½ | 9 |

**Boiler Tubes:** Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

| O.D. sizes | B.W.G. | —Seamless— Hot Rolled | Cold Drawn | —Elec. Weld— Hot Rolled | Cold Rolled |
|---|---|---|---|---|---|
| 1" | 13 | ..... | $9.90 | $9.36 | $9.65 |
| 1¼" | 13 | ..... | 11.73 | 9.63 | 11.43 |
| 1½" | 13 | $10.91 | 12.96 | 10.63 | 12.64 |
| 1¾" | 13 | 12.41 | 14.75 | 12.10 | 14.37 |
| 2" | 13 | 13.90 | 16.52 | 13.53 | 16.19 |
| 2¼" | 13 | 15.50 | 18.42 | 15.06 | 18.03 |
| 2¼" | 12 | 17.07 | 20.28 | 16.57 | 19.83 |
| 2½" | 12 | 18.70 | 22.21 | 18.11 | 21.68 |
| 2¾" | 12 | 19.82 | 23.54 | 19.17 | 22.95 |
| 3" | 12 | 20.79 | 24.71 | 20.05 | 24.02 |
| 3½" | 11 | 26.24 | 31.18 | 25.30 | 30.29 |
| 4" | 10 | 32.56 | 38.68 | 31.32 | 37.52 |
| 4½" | 9 | 43.16 | 51.29 | ..... | ..... |
| 5" | 9 | 49.96 | 59.36 | ..... | ..... |
| 6" | 7 | 76.71 | 91.14 | ..... | ..... |

**Pipe, Cast Iron:** Class B, 6-in. and over, $54 per net ton, Birmingham; $59, Burlington, N. J.; $62.80, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

## Rails, Supplies

Standard rails, over 60-lb, fob mill, net ton, $43.40. Light rails (billet), Pittsburgh, Chicago, Birmingham, net ton, $49.18.
*Relaying rails, 35 lb and over, fob railroad and basing points, $31-$33.
Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $51 net ton, base, Standard spikes, 3.65c.

* Fixed by OPA Schedule 46, Dec. 15, 1941.

## Tool Steels

**Tool Steels:** Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; Reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

| W. | Cr. | V. | Mo. | Base, per lb. |
|---|---|---|---|---|
| 18.00 | 4 | 1 | ... | 72.49c |
| 1.5 | 4 | 1 | 8.5 | 58.43c |
| ..... | 4 | 2 | 3 | 58.43c |
| 6.40 | 4.15 | 1.90 | 5 | 62.22c |
| 5.50 | 4.50 | 4 | 4.50 | 75.74c |

## Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

| | |
|---|---|
| Structural | 3.75c |
| ⅞-inch and under | 65-5 off |

## Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $2.75-$3.00 off

## Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago. Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow bolts.
(Ceiling prices advanced 7 per cent, effective Apr. 1, 1946; discounts remain unchanged.)

**Carriage and Machine**

| | |
|---|---|
| ½ x 6 and smaller | 65½ off |
| Do., ⅞ and ⅝ x 6-in. and shorter | 63½ off |
| Do., ¾ to 1 x 6-in. and shorter | 61 off |
| 1⅛ and larger, all lengths | 59 off |
| All diameters, over 6-in. long | 59 off |
| Tire bolts | 50 off |
| Step bolts | 56 off |
| Plow bolts | 65 off |

**Stove Bolts**

In packages, nuts separate, 71-10 off, nuts attached, 71 off; bulk, 80 off on 15,000 of 3-in and shorter, or 5000 over 3 in., nuts separate.

**Nuts**

| Semifinished hex | U.S.S. | S.A.E. |
|---|---|---|
| ⅞-in. and smaller | .. | 64 |
| ½-in. and smaller | 62 | .. |
| ½-in.-1-in. | .. | 60 |
| ⅞-in.-1-in. | 59 | .. |
| 1⅛-in.-1½-in. | 57 | 58 |
| 1⅝-in. and larger | 56 | .. |

Additional discount of 10 for full kegs.

**Hexagon Lap Screws**

| | |
|---|---|
| Upset 1-in., smaller | 64 off |
| Milled 1-in., smaller | 60 off |

**Square Head Set Screws**

| | |
|---|---|
| Upset 1-in. and smaller | 71 off |
| Headless, ¼-in. and larger | 60 off |
| No. 10 and smaller | 70 off |

## Stainless Steels

(Open market prices. OPA price control suspended Oct. 11, 1945.)
Base, Cents per lb

**CHROMIUM NICKEL STEELS**

| | Bars | Plates | Sheets | H. R. Strip | C. R. Strip |
|---|---|---|---|---|---|
| 302 | 25.96c | 29.21c | 36.79c | 23.93c | 30.30c |
| 303 | 28.13 | 31.38 | 38.95 | 29.21 | 35.71 |
| 304 | 27.05 | 31.38 | 38.95 | 25.45 | 32.46 |
| 308 | 31.38 | 36.79 | 44.36 | 30.84 | 37.87 |
| 309 | 38.95 | 43.28 | 50.85 | 40.08 | 50.95 |
| 310 | 53.02 | 56.26 | 57.35 | 52.74 | 60.59 |
| 312 | 38.95 | 43.28 | 53.02 | ..... | ..... |
| *316 | 43.28 | 47.61 | 51.94 | 43.28 | 51.94 |
| †321 | 31.38 | 36.79 | 44.36 | 31.65 | 41.12 |
| †347 | 35.71 | 41.12 | 48.69 | 35.71 | 45.44 |
| 431 | 20.56 | 23.80 | 31.38 | 18.94 | 24.35 |

**STRAIGHT CHROMIUM STEEL**

| | | | | | |
|---|---|---|---|---|---|
| 403 | 23.93 | 26.51 | 31.92 | 22.99 | 29.21 |
| **410 | 20.02 | 23.93 | 28.67 | 18.39 | 23.80 |
| 416 | 20.56 | 23.80 | 29.21 | 19.75 | 25.45 |
| ††420 | 25.96 | 30.84 | 36.25 | 25.70 | 39.49 |
| 430 | 20.56 | 23.80 | 31.38 | 18.94 | 24.35 |
| ††430F | 21.10 | 24.35 | 31.92 | 20.29 | 26.51 |
| 440A | 25.96 | 30.84 | 36.25 | 25.70 | 39.49 |
| 442 | 24.35 | 27.59 | 35.17 | 25.96 | 34.62 |
| 443 | 24.35 | 27.59 | 35.17 | 25.96 | 34.62 |
| 446 | 29.76 | 33.00 | 39.49 | 37.87 | 56.26 |
| 501 | 8.66 | 12.98 | 17.04 | 12.98 | 18.39 |
| 502 | 9.74 | 14.07 | 18.12 | 14.07 | 19.48 |

**STAINLESS CLAD STEEL (20%)**
(Fob Pittsburgh and Washington, Pa., plate prices include annealing and pickling.)

| | | | | | |
|---|---|---|---|---|---|
| 304 | .... | 19.48 | 20.56 | .... | .... |
| 410 | .... | 17.31 | 18.39 | .... | .... |
| 430 | .... | 17.85 | 18.94 | .... | .... |
| 446 | .... | 19.48 | 20.56 | .... | .... |

* With 2-3% molybdenum. § With titanium. † With columbium. ** Plus machining agent. †† High carbon. ‡‡ Free machining.

## Metallurgical Coke

Price Per Net Ton

**Beehive Ovens**

| | |
|---|---|
| Connellsville, furnace | *7.50 |
| Connellsville, foundry | 8.00- 8.50 |
| New River, foundry | 9.00- 9.25 |
| Wise county, foundry | 7.75- 8.25 |
| Wise county, furnace | 7.25- 7.75 |
| **By-Product Foundry** | |
| Kearney, N. J., ovens | 13.05 |
| Chicago, outside delivered | 13.00 |
| Chicago, delivered | 13.75 |
| Terre Haute, delivered | 13.50 |
| Milwaukee, ovens | 13.75 |
| New England, delivered | 14.65 |
| St. Louis, delivered | †13.75 |
| Birmingham, delivered | 10.90 |
| Indianapolis, delivered | 13.50 |
| Cincinnati, delivered | 13.25 |
| Cleveland, delivered | 13.20 |
| Buffalo, delivered | 13.40 |
| Detroit, delivered | 13.75 |
| Philadelphia, delivered | 13.28 |

*Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945.
†14.25 from other than Ala., Mo., Tenn.

## Coke By-Products

| | |
|---|---|
| Spot, gal, freight allowed east of Omaha | |
| Pure and 90% benzol | 15.00c |
| Toluol, two degree | 27.00c |
| Solvent naphtha | 26.00c |
| Industrial xylol | 26.00c |
| Per pound fob works | |
| Phenol (car lots, returnable drums) | 10.50c |
| Do., less than carlots | 11.25c |
| Do., tank cars | 9.50c |
| Eastern plants, per pound | |
| Naphthalene flakes, balls, bbl, to jobbers | 8.00c |
| Per ton, bulk, fob port | |
| Sulphate of ammonia | $20.20 |

# WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on OPA mill prices announced March 1, 1946.

| | Hot-rolled bars | Structural shapes | Plates | Floor plates | Hot-rolled sheets (10-gage base) | Hot-rolled strip (14-gage and lighter, 6-in and narrower) | Hot-rolled strip (12-gage and heavier wider than 6-inch) | Galvanized flat sheets (24-gage base) | Cold-rolled sheets (17-gage base) | Cold finished bars | Cold-rolled strip |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Boston | 4.294[1] | 4.162[1] | 4.162[1] | 5.977[1] | 3.999[1] | 5.456[1] | 4.356[1] | 5.674[14] | 4.969[14] | 4.594[12] | 4.965 |
| New York | 4.103[1] | 4.008[1] | 4.018[1] | 5.824[1] | 3.815[1] | 4.324[1] | 4.224[1] | 5.460[12] | 4.838[14] | 4.553[21] | 5.024 |
| Jersey City | 4.103[1] | 3.997[1] | 4.018[1] | 5.824[1] | 3.815[1] | 4.324[1] | 4.224[1] | 5.460[13] | 4.838[14] | 4.553[21] | 5.024 |
| Philadelphia | 4.072[1] | 3.916[1] | 3.855[1] | 3.768[1] | 3.743[1] | 4.622[1] | 4.522[1] | 5.468[15] | 5.097[25] | 4.022[21] | 5.022 |
| Baltimore | 4.052[1] | 4.009[1] | 3.844[1] | 5.502[1] | 3.619[1] | 4.252[1] | 4.152[1] | 5.344[1] | 5.077[25] | 4.502[21] | ..... |
| Washington | 4.191[1] | 4.180[1] | 4.046[1] | 5.591[1] | 3.821[1] | 4.391[1] | 4.291[1] | 5.646[17] | 5.066[20] | 4.491[21] | ..... |
| Norfolk, Va. | 4.315[1] | 4.252[1] | 4.221[1] | 5.715[1] | 3.996[1] | 4.865[1] | 4.415[1] | 5.821[17] | 4.490[24] | 4.615[21] | ..... |
| Bethlehem, Pa.* | ..... | 3.70[1] | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Claymont, Del.* | ..... | ..... | 3.70[1] | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Coatesville, Pa.* | ..... | ..... | 3.70[1] | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Buffalo (city) | 3.60[1] | 3.65[1] | 3.88[1] | 5.51[1] | 3.575[1] | 4.169[1] | 4.069[1] | 5.20[15] | 4.625[10] | 4.20[21] | 4.919 |
| Buffalo (country) | 3.50[1] | 3.55[1] | 3.55[1] | 5.15[1] | 3.475[1] | 3.85[1] | 3.750[1] | 5.10[51] | 4.525[16] | 4.10[21] | 4.60 |
| Pittsburgh (city) | 3.60[1] | 3.65[1] | 3.65[1] | 5.25[1] | 3.575[1] | 3.95[1] | 3.850[1] | 5.327[12] | 4.625[24] | 4.20[21] | 4.70 |
| Pittsburgh (country) | 3.50[1] | 3.55[1] | 3.55[1] | 5.15[1] | 3.475[1] | 3.85[1] | 3.750[1] | 5.10[13] | 4.525[24] | 4.10[21] | 4.60 |
| Cleveland (city) | 3.60[1] | 3.838[1] | 3.65[1] | 5.438[1] | 3.575[1] | 3.95[1] | 3.850[1] | 5.327[12] | 4.625[24] | 4.20[21] | 4.70 |
| Cleveland (country) | 3.50[1] | . | 3.55[1] | . | 3.475[1] | 3.85[1] | 3.750[1] | ..... | 4.525[24] | 4.10[21] | 4.60 |
| Detroit | 3.70[1] | 3.911[1] | 3.859[1] | 5.531[1] | 3.675[1] | 4.050[1] | 3.950[1] | 5.450[12] | 4.725[24] | 4.25[12] | 4.909 |
| Omaha (city, del.) | 4.293[1] | 4.343[1] | 4.343[1] | 5.943[1] | 4.018[1] | 4.493[1] | 4.393[1] | 5.965[15] | 5.668[24] | 4.893[21] | ..... |
| Omaha (country) | 4.193[1] | 4.243[1] | 4.243[1] | 5.843[1] | 3.918[1] | 4.393[1] | 4.293[1] | 5.865[15] | ..... | ..... | ..... |
| Cincinnati | 3.861[1] | 3.941[1] | 3.911[1] | 5.541[1] | 3.650[1] | 4.025[1] | 3.925[1] | 5.275[15] | 4.700[24] | 4.461[21] | 4.961 |
| Youngstown* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 4.85[12] | ..... | ..... | ..... |
| Middletown, O.* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 5.10[16] | ..... | ..... | ..... |
| Chicago (city) | 3.75[1] | 3.80[1] | 3.80[1] | 5.40[1] | 3.475[1] | 3.85[1] | 3.750[1] | ‡5.40[15] | 4.425[24] | 4.20[21] | 4.90 |
| Milwaukee | 3.887[1] | 3.937[1] | 3.937[1] | 5.537[1] | 3.612[1] | 4.087[1] | 3.987[1] | 5.722[15] | 4.562[24] | 4.337[21] | 5.037 |
| Indianapolis | 3.83[1] | 3.88[1] | 3.88[1] | 5.48[1] | 3.743[1] | 4.118[1] | 4.018[1] | 5.368[15] | 4.793[24] | 4.43[21] | 5.030 |
| St. Paul | 4.072[3] | 4.122[3] | 4.122[3] | 5.722[3] | 3.797[3] | 4.272[3] | 4.172[3] | 5.635[15] | 4.747[24] | 4.811[21] | 5.352 |
| St. Louis | 3.897[1] | 3.947[1] | 3.947[1] | 5.547[1] | 3.622[1] | 4.097[11] | 3.997[1] | 5.622[15] | 4.572[24] | 4.481[21] | 5.181 |
| Memphis, Tenn. | 4.265[1] | 4.315[1] | 4.315[1] | 6.03[1] | 4.190[1] | 4.565[1] | 4.465[1] | 5.715[15] | 5.005[24] | 4.78[21] | ..... |
| Birmingham | 3.75[1] | 3.80[1] | 3.80[1] | 6.153[1] | 3.675[1] | 4.05[1] | 4.05[1] | 5.20[15] | 5.077[24] | 4.99[21] | 5.465 |
| New Orleans (city) | 4.358[1] | 4.408[1] | 4.408[1] | 6.329[1] | 4.283[1] | 4.658[1] | . | 5.808[15] | 5.304[24] | 5.079[21] | ..... |
| Houston, Tex. | 4.00[3] | 4.50[1] | 4.50[1] | 5.75[9] | 3.988[3] | 4.663[3] | 4.563[3] | 5.763[20] | 5.819[10] | 4.10[22] | ..... |
| Los Angeles | 4.65[4] | 4.90[4] | 5.20[4] | 7.45[4] | 5.225[4] | 5.30[4] | 5.200[4] | 6.55[12] | 7.425[6] | 6.033[21] | 5.863 |
| San Francisco | 4.20[7] | 4.15[7] | 4.15[7] | 5.85[7] | 4.125[7] | 5.85[7] | 4.50[7] | 6.35[15] | 6.875[15] | 5.783[21] | 7.583 |
| Portland, Oreg. | 4.70[27] | 4.70[27] | 5.00[27] | 6.75[27] | 4.875[27] | 6.65[27] | 5.000[27] | 6.20[15] | 6.825[15] | 5.983[15] | ..... |
| Tacoma, Wash. | 4.60[6] | 4.70[6] | 5.00[6] | 6.75[6] | 4.87[6] | 5.80[6] | 4.60[6] | 6.40[15] | 6.55[15] | 6.23[21] | ..... |
| Seattle | 4.60[6] | 4.70[6] | 5.00[6] | 6.75[6] | 4.87[6] | 5.80[6] | 4.60[6] | 6.40[15] | 6.55[15] | 6.23[21] | ..... |

* Basing point cities with quotations representing mill prices, plus warehouse spread; ‡ open market price.

NOTE—Ceiling prices fixed by Office of Price Administration in Revised Price Schedule No. 49, as amended. Deliveries outside above cities computed in accordance with regulations.

**BASE QUANTITIES**

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles.. [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

## Ores

### Lake Superior Iron Ore

*Gross ton, 51½% (Natural) Lower Lake Ports*

| | |
|---|---|
| Old range bessemer | $4.95 |
| Mesabi nonbessemer | 4.55 |
| High phosphorus | 4.55 |
| Mesabi bessemer | 4.70 |
| Old range nonbessemer | 4.80 |

### Eastern Local Ore

*Cents, units, del. E. Pa.*

| | |
|---|---|
| Foundry and basic 56-63% contract | 13.00 |

### Foreign Ore

*Cents per unit, cif Atlantic ports*

| | |
|---|---|
| Manganiferous ore, 45-55% Fe., 6-10% Mn. | Nom. |
| N. African low phos. | Nom. |
| Swedish basic, 60 to 68% | Nom. |
| Spanish, N. African basic, 50 to 60% | Nom. |
| Brazil iron ore, 68-69% fob Rio de Janeiro | 7.50-8.00 |

### Tungsten Ore

| | |
|---|---|
| Chinese Wolframite, per short ton unit, duty paid | $24.00 |

### Chrome Ore

(Equivalent OPA schedules):

*Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.*

*(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)*

Indian and African

| | |
|---|---|
| 48% 2.8:1 | $39.75 |
| 48% 3:1 | 41.00 |
| 48% no ratio | 31.00 |

South African (Transvaal)

| | |
|---|---|
| 44% no ratio | $27.40 |
| 45% no ratio | 28.30 |
| 48% no ratio | 31.00 |
| 50% no ratio | 32.80 |

Brazilian—nominal

| | |
|---|---|
| 44% 2.5:1 lump | $33.65 |
| 48% 3:1 lump | 43.50 |

Rhodesian

| | |
|---|---|
| 45% no ratio | $28.30 |
| 48% no ratio | 31.00 |
| 48% 3:1 lump | 41.00 |

Domestic (seller's nearest rail)

| | |
|---|---|
| 48% 3:1 | $43.50 |

less $7 freight allowance.

### Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended MPR No. 248, effective May 15, 1944. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 10c per unit less than Metal Reserve prices.

### Molybdenum

| | |
|---|---|
| Sulphide conc., lb., Mo. cont., mines | $0.75 |

## NATIONAL EMERGENCY STEELS (Hot Rolled)

*(Extras for alloy content)*

Basic open-hearth Electric furnace

| Designation | Chemical Composition Limits, Per Cent | | | | | | Bars per 100 lb. | Billets per GT | Bars per 100 lb. | Billets per GT |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon | Mn | Si | Cr | Ni | Mo | | | | |
| NE 9415 | .13-.18 | .80-1.10 | .20-.35 | .30-.50 | .30-.60 | .08-.15 | $0.780 | $15.60 | $1.300 | $26.00 |
| NE 9425 | .23-.28 | .80-1.20 | .20-.35 | .30-.50 | .30-.60 | .08-.15 | .780 | 15.60 | 1.300 | 26.00 |
| NE 9442 | .40-.45 | 1.00-1.30 | .20-.35 | .30-.50 | .30-.60 | .08-.15 | .832 | 16.64 | 1.352 | 27.04 |
| NE 9722 | .20-.25 | .50-.80 | .20-.35 | .10-.25 | .40-.70 | .15-.25 | .676 | 13.52 | 1.196 | 23.92 |
| NE 9912 | .10-.15 | .50-.70 | .20-.35 | .40-.60 | 1.00-1.30 | .20-.30 | 1.248 | 24.96 | 1.612 | 32.24 |
| NE 9920 | .18-.23 | .50-.70 | .20-.35 | .40-.60 | 1.00-1.30 | .20-.30 | 1.248 | 24.96 | 1.612 | 32.24 |

Extras are in addition to a base price of 2.808c, per pound on finished products and $56.16 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

## Pig Iron

Prices (in gross tons) are maximum fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, Oct. 23, 1945, and March 15, 1946. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included.

| | No. 2 Foundry | Basic | Bessemer | Malleable |
|---|---|---|---|---|
| **Bethlehem, Pa., base** | $27.50 | $27.00 | $28.50 | $28.00 |
| Newark, N. J., del. | 29.03 | 28.53 | 30.03 | 29.53 |
| Brooklyn, N. Y., del. | 30.00 | ..... | ..... | 30.50 |
| **Birdsboro, Pa., base** | 27.50 | 27.00 | 28.50 | 28.00 |
| **Birmingham, base** | 22.88 | 21.50 | 27.50 | ..... |
| Baltimore, del. | 28.11 | ..... | ..... | ..... |
| Boston, del. | 27.64 | ..... | ..... | ..... |
| Chicago, del. | 26.72 | ..... | ..... | ..... |
| Cincinnati, del. | 26.94 | 26.06 | ..... | ..... |
| Cleveland, del. | 26.62 | 25.74 | ..... | ..... |
| Newark, N. J. | 28.64 | ..... | ..... | ..... |
| Philadelphia, del. | 27.96 | 27.46 | ..... | ..... |
| St. Louis, del. | 26.62 | 27.54 | ..... | ..... |
| **Buffalo, base** | 26.50 | 25.50 | 27.50 | 27.00 |
| Boston, del. | 28.00 | 27.00 | 29.00 | 28.50 |
| Rochester, del. | 28.03 | ..... | 29.03 | 28.53 |
| Syracuse, del. | 28.58 | ..... | 29.58 | 29.08 |
| **Chicago, base** | 26.50 | 26.00 | 27.00 | 26.50 |
| Milwaukee, del. | 27.60 | 27.10 | 28.10 | 27.60 |
| Muskegon, Mich., del. | 27.69 | ..... | ..... | 27.69 |
| **Cleveland, base** | 26.50 | 26.00 | 27.00 | 26.50 |
| Akron, Canton, del. | 27.89 | 27.39 | 28.39 | 27.89 |
| **Detroit, base** | 26.50 | 26.00 | 27.00 | 26.50 |
| Saginaw, Mich., del. | 28.81 | 28.31 | 29.31 | 28.81 |
| **Duluth, base** | 27.00 | 26.50 | 27.50 | 27.00 |
| St. Paul, del. | 29.13 | 28.63 | 29.63 | 29.13 |
| **Erie, Pa., base** | 26.50 | 26.00 | 27.50 | 27.00 |
| **Everett, Mass., base** | 27.50 | 27.00 | 28.50 | 28.00 |
| Boston, del. | 28.00 | 27.50 | 29.00 | 28.50 |
| **Granite City, Ill., base** | 26.50 | 26.00 | 27.00 | 26.50 |
| St. Louis, del. | 27.00 | 26.50 | ..... | 27.00 |
| **Hamilton, O., base** | 26.50 | 26.00 | ..... | 26.50 |
| Cincinnati, del. | 27.61 | 27.11 | ..... | 27.61 |
| **Neville Island, Pa., base** | 26.50 | 26.00 | 27.00 | 26.50 |
| *Pittsburgh, del. N. & S. sides | 27.19 | 26.69 | 27.69 | 27.19 |
| **Provo, Utah, base** | 24.50 | 24.00 | ..... | ..... |
| **Sharpsville, Pa., base** | 26.50 | 26.00 | 27.00 | 26.50 |
| **Sparrows Point, base** | 27.50 | 27.00 | ..... | ..... |
| Baltimore, del. | 28.49 | ..... | ..... | ..... |
| **Steelton, Pa., base** | ..... | 27.00 | ..... | ..... |
| **Swedeland, Pa., base** | 27.50 | 27.00 | 28.50 | 28.00 |
| Philadelphia, del. | 28.34 | 27.84 | ..... | 28.84 |
| **Toledo, O., base** | 26.50 | 26.00 | 27.00 | 26.50 |
| **Youngstown, O., base** | 26.50 | 26.00 | 27.00 | 26.50 |
| Mansfield, O., del. | 28.44 | 27.94 | 28.94 | 28.44 |

*To Neville Island base add: 55 cents for McKees Rocks, Pa.; 84 cents, Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97 cents (water), Monongahela; $1.11, Oakmont, Verona; $1.24, Brackenridge.

Exception to Ceiling Prices: Struthers Iron & Steel Co., Struthers, O., may charge 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron.

Ceiling Prices are aggregate of (1) governing basing point, (2) differentials, and (3) transportation charges from governing basing point to

### High Silicon, Silvery

6.00-6.50 per cent (base) ....$32.00
6.51-7.00.. $33.00 9.01- 9.50. 38.00
7.01-7.50.. 34.00 9.51-10.00. 39.00
7.51-8.00.. 35.00 10.01-10.50. 40.00
8.01-8.50.. 36.00 10.51-11.00. 41.00
8.51-9.00.. 37.00 11.01-11.50. 42.00

Fob Jackson county, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

**Electric Furnace Ferrosilicon:** Si 14.01 to 14.50%, $45.50 Jackson co.; each additional 0.50% silicon up to and including 18% add $1; low impurities not exceeding 0.005 P, 0.40 Si, 1.0% C, add $1.

### Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

### Charcoal Pig Iron

Semi-cold blast, low phosphorus.

Fob furnace, Lyles, Tenn., $33.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

### Gray Forge

Neville Island, Pa. .....$26.00
Valley base ..... 26.00

### Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $32.00 base; $33.24, del. Philadelphia. Intermediate phosphorus, Central Furnace, Cleveland, $29.00.

### Differentials

Basing point prices are subject to following differentials:

**Silicon:** An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

**Phosphorus:** A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

**Manganese:** An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

**Nickel:** An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

## Refractories

Per 1000, fob shipping point. Net prices

### Fire Clay Brick

Super Duty

Pa., Mo., Ky. .....$76.05

High Heat Duty

Pa., Ill., O., Md., Mo., Ky. 60.40
Ala., Ga. ..... 60.40
N. J. ..... 65.90

Intermediate Heat Duty

Ohio ..... 50.60
Pa., Ill., Md., Mo., Ky. ..... 54.80
Ala., Ga. ..... 49.15
N. J. ..... 54.80

Low Heat Duty

Pa., Md., Ohio ..... 42.35

### Malleable Bung Brick

All bases ..... 70.45

### Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press ..... 36.45
Wire Cut ..... 34.15

### Silica Brick

Pennsylvania ..... 60.40
Joliet, E. Chicago ..... 69.30
Birmingham, Ala. ..... ... 60.40

### Magnesite

Domestic dead-burned grains, net ton fob Chewelah, Wash., net ton, bulk ..... 22.00
net ton, bags ..... 26.00

### Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick ..... 54.00
Chem. bonded chrome ..... 54.00
Magnesite brick ..... 76.00
Chem. bonded magnesite .... 65.00

## Fluorspar

Metallurgical grade, fob Ill., Ky., net tons, carloads, $CaF_2$ content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29, 1944, base price any grade $30.00.

## Ferroalloy Prices

**Ferromanganese, standard:** 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140 fob cars, Pittsburgh (where Carnegie-Illinois Steel Corp. is producer); add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

**Ferromanganese, low carbon:** Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.55c; regular, 21.05c; medium, 15.75c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

**Spiegeleisen:** 19-21% carlot per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

**Electrolytic Manganese:** 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

**Chromium Metal:** 97% min. chromium, max. 0.50% carbon, eastern zone, per lb contained chromium bulk, c.l., 79.50c, 2000 lb to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; fob shipping point, freight allowed.

**Ferrocolumbium:** 50-60% per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb higher.

**Ferrochrome:** High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l. 13.90c; central, add 0.40c and 0.65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l. max. 0.06% carbon 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 2.00% 22.50c 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add 0.4c for bulk, c.l. and 0.65c for 2000 lb to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb c.l.; carload packed differential 0.45c; fob shipping point, freight allowed. Prices per lb contained Cr, high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each 0.25% of nitrogen over 0.75%.

**Special Foundry Ferrochrome:** (Cr 62-66%; C approx. 5-7%.) Contract, carload bulk 13.50c, packed 13.95c, ton lots 14.40c, less 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up 0.25c.

**S.M. Ferrochrome, high carbon:** (Cr 60-65%, Si 4-6%, Mn 4-6% and C 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up 0.25c; per pound contained chromium.

**S.M. Ferrochrome, low carbon:** (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c.

**SMZ Alloy:** (Si 60-55%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) per lb of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up 0.25c.

**Silicaz Alloy:** (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up 0.25c.

**Silvaz Alloy:** (Si 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up 0.25c.

**CMSZ Alloy 4:** (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 0.25c.

**CMSZ Alloy 5:** (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c, 12.50c, 13.00c, central; 13.25c, 13.75c, 14.50c and 15.00c, western; spot up 0.25c.

**Ferro-Boron:** (B 17.50% min., Si 1.50% max., Al 0.50% max. and C 0.50% max.) per lb of alloy contract ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

**Manganese-Boron:** (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) per lb of alloy. Contract ton lots, $1.89, less $2.01, eastern; freight allowed; $1.903 and $2.023, central; $1.935 and $2.055 western; spot up 5c.

**Nickel-Boron:** (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance), per lb of alloy. Contract, 5 tons or more, $1.90, 1 ton to 8 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

**Chromium-Copper:** (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

**Vanadium Oxide:** (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

**Calcium metal; cast:** Contract ton lots or more $1.35, less, $1.60, pound of metal; $1.36 and $1.61 central, $1.40 and $1.65, western; spot up 5c.

**Calcium-Manganese-Silicon:** (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

**Calcium-Silicon:** (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

**Briquets, Ferromanganese:** (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Contract, carlots, bulk 0.0605c, packed 0.063c, tons 0.0655c, less 0.068c eastern freight allowed; 0.063c, 0.0655c, 0.0755c and 0.078c, central; 0.066c, 0.0685c, 0.0855c and 0.088c, western; spot up 0.25c.

**Briquets, Ferrochrome:** Containing exactly 2 lb Cr, eastern zone, bulk, c.l., 8.25c per lb of briquets, 2000 lb to c.l., 8.75c; central, add 0.3c for c.l. and 0.5c for 2000 lb to c.l.; western add 0.70c for c.l., and 0.2c for 2000 lb to c.l.; **silicomanganese,** eastern, containing exactly 2 lb Mn and approx. ½ lb Si, bulk, c.l., 5.80c, 2000 lb to c.l., 6.35c; central add 0.25c for c.l. and 1c for 2000 lb to c.l., western, add 0.55c for c.l., and 0.2c for 2000 lb to c.l.; **ferrosilicon,** eastern, approx. 5 lb, containing exactly 2 lb Si, or weighing approx. 2½ lb and containing exactly 1 lb of Si, bulk, c.l. 3.35c, 2000 lb to c.l., 3.80c; central, add 0.15c for c.l., and 0.40c for 2000 lb to c.l.; western, add 0.30c for c.l. and 0.45c for 2000 to c.l.; fob shipping point, freight allowed.

**Ferromolybdenum:** 55-75% per lb contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

**Ferrophosphrous:** 17-19%, based on 18% P content, with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

**Ferrosilicon:** Eastern zone, 90-95%, bulk c.l., 11.05c, 2000 lb to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 lb to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 lb to c.l., 8.75c; fob shipping peint, freight allowed. Prices per lb contained Si.

**Grainal:** Vanadium Grinal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

**Silicon Metal:** Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l., 12.90c; 2000 lb to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l., 12.50c, 2000 lb to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c, fob shipping point, freight allowed. Price per lb contained Si.

**Manganese Metal:** (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c.

**Ferrotungsten:** Spot 10,000 lb or more, per lb contained W, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

**Tungsten Metal Powder:** Spot, not less than 97%, $2.50-$2.60; freight allowed as far west as St. Louis.

**Ferrotitanium:** 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastearn. Spot up 5c per lb.

**Ferrotitanium:** 20-25%, 0.10 maximum carbon; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

**High-Carbon Ferrotitanium:** 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

**Carbortam:** B 0.90 to 1.15% net ton to carload, 8c per lb fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

**Bortam:** B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

**Ferrovanadium:** Va 35-55%, contract basis, per lb contained Va, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

**Zirconium Alloys:** Zr 12-15%, per lb of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot up ¼c per ton.

**Zirconium Alloy:** Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up ¼c.

**Alsifer:** (Approx. 20% Al, 40% Si, 40% Fe) contract basis fob Niagara Falls, N. Y., lump, per lb 5.50c; ton lots 6.00c. Spot up ½c.

**Siminal:** (Approx. 20% each Si, Mn, Al) Contract, freight not exceeding St. Louis rate allowed, per lb alloy; carlots 8c; ton lots 8.75c; less-ton lots 9.25c.

**Borosil:** 3 to 4% B, 40 to 45% Si, $6.25 lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

# OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to maximum price regulation No. 4. Quotations are on gross tons.

**PHILADELPHIA:**

(Delivered consumer's plant)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $18.75 |
| No. 2 Heavy Melt. Steel | 18.75 |
| No. 2 Bundles | 18.75 |
| No. 3 Bundles | 16.75 |
| Mixed Borings, Turnings | 13.75 |
| Machine Shop Turnings | 13.75 |
| Billet, Forge Crops | 23.75 |
| Bar Crops, Plate Scrap | 21.25 |
| Cast Steel | 21.25 |
| Punchings | 21.25 |
| Elec. Furnace Bundles | 19.75 |
| Heavy Turnings | 18.25 |

**Cast Grades**

(Fob Shipping Point)

| | |
|---|---|
| Heavy Breakable Cast | 16.50 |
| Charging Box Cast | 19.00 |
| Cupola Cast | 20.00 |
| Unstripped Motor Blocks | 17.50 |
| Malleable | 22.00 |
| Chemical Borings | 16.51 |

**NEW YORK:**

(Dealers' buying prices)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $15.33 |
| No. 2 Heavy Melt. Steel | 15.33 |
| No. 2 Hyd. Bundles | 15.33 |
| No. 3 Hyd. Bundles | 13.33 |
| Chemical Borings | 14.33 |
| Machine Turnings | 10.33 |
| Mixed Borings, Turnings | 10.33 |
| No. 1 Cupola | 20.00 |
| Charging Box | 19.00 |
| Heavy Breakable | 16.50 |
| Unstripped Motor Blocks | 17.50 |
| Stove Plate | 19.00 |

**BOSTON:**

(Fob shipping points. Boston differential 99c higher, steelmaking grades; Providence, $1.09 higher)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $14.06 |
| No. 2 Heavy Melt. Steel | 14.06 |
| No. 1 Bundles | 14.06 |
| No. 2 Bundles | 14.06 |
| No. 1 Busheling | 14.06 |
| Machine Shop Turnings | 9.06 |
| Mixed Borings, Turnings | 9.06 |
| Short Shovel Turnings | 11.06 |
| Chemical Borings | 13.31 |
| Low Phos. Clippings | 16.56 |
| No. 1 Cast | 20.00 |
| Clean Auto Cast | 20.00 |
| Stove Plate | 19.00 |
| Heavy Breakable Cast | 16.50 |

**BUFFALO:**

(Delivered consumer's plant)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $19.25 |
| No. 2 Heavy Melt. Steel | 19.25 |
| No. 1 Bundles | 19.25 |
| No. 2 Bundles | 19.25 |
| No. 1 Busheling | 19.25 |
| Machine Turnings | 14.25 |
| Short Shovel Turnings | 16.25 |
| Mixed Borings, Turn. | 14.25 |
| Cast Iron Borings | 15.25 |
| Low Phos. | 21.75 |

**PITTSBURGH:**

(Delivered consumer's plant)

| | |
|---|---|
| Railroad Heavy Melting | $21.00 |
| No. 1 Heavy Melt. Steel | 20.00 |
| No. 2 Heavy Melt. Steel | 20.00 |
| No. 1 Comp. Bundles | 20.00 |
| No. 2 Comp. Bundles | 20.00 |
| Short Shovel Turnings | 17.00 |
| Mach. Shop Turnings | 15.00 |
| Mixed Borings, Turnings | 15.00 |
| No. 1 Cupola Cast | *20.00 |
| Heavy Breakable Cast | *16.50 |
| Cast Iron Borings | 16.00 |
| Billet, Bloom Crops | 25.00 |
| Sheet Bar Crops | 22.50 |
| Plate Scrap, Punchings | 22.50 |
| Railroad Specialties | 24.50 |
| Scrap Rail | 21.50 |
| Axles | 26.00 |
| Rail 3 ft. and under | 23.50 |
| Railroad Malleable | 22.00 |

* Shipping point.

**CLEVELAND:**

(Delivered consumer's plant)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $19.50 |
| No. 2 Heavy Melt. Steel | 19.50 |
| No. 1 Comp. Bundles | 19.50 |
| No. 2 Comp. Bundles | 19.50 |
| No. 1 Busheling | 19.50 |
| Mach. Shop Turnings | 14.50 |
| Short Shovel Turnings | 16.50 |
| Mixed Borings, Turnings | 14.50 |
| No. 1 Cupola Cast | 20.00 |
| Heavy Breakable Cast | 16.50 |
| Cast Iron Borings | 13.50-14.00 |
| Billet, Bloom Crops | 24.50 |
| Sheet Bar Crops | 22.00 |
| Plate Scrap, Punchings | 22.00 |
| Elec. Furnace Bundles | 20.50 |

**VALLEY:**

(Delivered consumer's plant)

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | $21.00 |
| No. 1 Heavy Melt Steel | 20.00 |
| No. 1 Comp. Bundles | 20.00 |
| Short Shovel Turnings | 17.00 |
| Cast Iron Borings | 16.00 |
| Machine Shop Turnings | 15.00 |
| Low Phos. Plate | 22.50 |

**MANSFIELD:**

(Delivered consumer's plant)

| | |
|---|---|
| Machine Shop Turnings | $15.00 |

**CINCINNATI:**

(Delivered consumer's plant)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $19.50 |
| No. 2 Heavy Melt. Steel | 19.50 |
| No. 1 Comp. Bundles | 19.50 |
| No. 2 Comp. Bundles | 19.50 |
| Machine Turnings | 10.50-11.00 |
| Shoveling Turnings | 12.50-13.00 |
| Cast Iron Borings | 11.50-12.00 |
| Mixed Borings, Turnings | 10.50-11.00 |
| No. 1 Cupola Cast | 20.00 |
| Breakable Cast | 16.50 |
| Low Phosphorus | 21.00-22.00 |
| Scrap Rails | 20.50-21.00 |
| Stove Plate | 18.50-19.00 |

**DETROIT:**

(Delivered consumer's plant)

| | |
|---|---|
| Heavy Melting Steel | $17.32 |
| No. 1 Busheling | 17.32 |
| Hydraulic Bundles | 17.32 |
| Flashings | 17.32 |
| Machine Turnings | 12.32 |
| Short Shovel, Turnings | 14.32 |
| Cast Iron Borings | 13.32 |
| Low Phos. Plate | 19.82 |
| No. 1 Cast | 20.00 |
| Heavy Breakable Cast | 16.50 |

**CHICAGO:**

(Delivered consumer's plant; cast grades fob shipping point; railroad grades fob tracks)

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | $19.75 |
| No. 1 Heavy Melt. Steel | 18.75 |
| No. 2 Heavy Melt. Steel | 18.75 |
| No. 1 Ind. Bundles | 18.75 |
| No. 2 Dir. Bundles | 18.75 |
| Baled Mach. Shop Turn. | 18.75 |
| No. 3 Galv. Bundles | 16.75 |
| Machine Turnings | 13.75 |
| Mix. Borings, Sht. Turn. | 13.75 |
| Short Shovel Turnings | 15.75 |
| Cast Iron Borings | 14.75 |
| Scrap Rails | 20.25 |
| Cut Rails, 3 feet | 22.25 |
| Cut Rails, 18-inch | 23.50 |
| Rerolling Rails | 22.25 |
| Angles, Splice Bars | 22.25 |
| Plate Scrap, Punchings | 21.25 |
| Railroad Specialties | 22.75 |
| No. 1 Cast | 20.00 |
| R.R. Malleable | 22.00 |

**ST. LOUIS:**

(Delivered consumer's plant; cast grades fob shipping point)

| | |
|---|---|
| Heavy Melting | $17.50 |
| No. 1 Locomotive Tires | 21.00 |
| Misc. Rails | 19.00 |
| Railroad Springs | 22.00 |
| Bundled Sheets | 17.50 |
| Axle Turnings | 17.00 |
| Machine Turnings | 10.50 |
| Shoveling Turnings | 12.50 |
| Rerolling Rails | 21.00 |
| Street Car Axles | 24.50 |
| Steel Rails, 3 ft. | 21.50 |
| Steel Angle Bars | 21.00 |
| Cast Iron Wheels | 20.00 |
| No. 1 Machinery Cast | 20.00 |
| Railroad Malleable | 22.00 |
| Breakable Cast | 16.50 |
| Stove Plate | 19.00 |
| Grate Bars | 15.25 |
| Brake Shoes | 15.25 |

**BIRMINGHAM:**

(Delivered consumer's plant)

| | |
|---|---|
| Billet Forge Crops | $22.50 |
| Structural, Plate Scrap | 19.00 |
| Scrap Rails Random | 18.50 |
| Rerolling Rails | 20.50 |
| Angle Splice Bars | 20.50 |
| Solid Steel Axles | 24.00 |
| Cupola Cast | 20.00 |
| Stove Plate | 19.00 |
| Long Turnings | 11.00 |
| Cast Iron Borings | 13.00 |
| Iron Car Wheels | 20.00 |

**LOS ANGELES:**

(Delivered consumer's plant)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $14.00 |
| No. 2 Heavy Melt. Steel | 13.00 |
| No. 1, 2 Dir. Bundles | 12.00 |
| Machine Turnings | 5.50 |
| Mixed Borings, Turnings | 5.50 |
| No. 1 Cast | 20.00 |

**SAN FRANCISCO:**

(Delivered consumer's plant)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $15.00 |
| No. 2 Heavy Melt. Steel | 14.00 |
| No. 1 Busheling | 15.50 |
| No. 1, No. 2 Bundles | 13.00 |
| No. 3 Bundles | 8.50 |
| Machine Turnings | 7.00 |
| Billet, Forge Crops | 15.50 |
| Bar Crops, Plate | 15.50 |
| Cast Steel | 15.50 |
| Cut, Structural, Plate 1 ft and under | 18.00 |
| Alloy-free Turnings | 7.00 |
| Tin Can Bundles | 14.50 |
| No. 2 Steel Wheels | 15.50 |
| Iron, Steel Axles | 23.00 |
| No. 2 Cast Steel | 15.50 |
| Uncut Frogs, Switches | 15.50 |
| Scrap Rails | 15.00 |
| Locomotive Tires | 15.50 |

**SEATTLE:**

(Delivered consumer's plant)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $14.12 |
| No. 2 Heavy Melt. Steel | 14.12 |
| Heavy Railroad Scrap | 14.50 |

(Fob shipping point)

| | |
|---|---|
| No. 1 Cupola Cast | 20.00 |

# NONFERROUS METAL PRICES

**Copper:** Electrolytic or Lake from producers in carlots 12.00c, del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more; 12.00c less than 20,000 lbs.

**Brass Ingot:** Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; No. 1 yellow (No. 405) 10.00c.

**Zinc:** Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

**Lead:** Common 6.35c, chemical, 6.45c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland - Akron - Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston - Worcester, Springfield, New Hampshire, Rhode Island.

**Primary Aluminum:** 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

**Secondary Aluminum:** Piston alloy (No. 122 type) 10.50-11.00c; No. 12 foundry alloy (No. 2 grade) 10.50-10.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 11.75-12.00c; grade 2 (92-95%) 10.25-10.75c; grade 3 (90-92%) 8.50-9.00c; grade 4 (85-90%) 8.25-8.50c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 1000-10,000 lb; 1c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

**Magnesium:** Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 27.50c, carlots; 29.50c 100 lb to c.l.

**Tin:** Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

**Antimony:** American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

**Nickel:** Electrolytic cathodes, 99.5%, fob refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c.

**Mercury:** Open market, spot, New York, $103-$107 per 76-lb flask.

**Arsenic:** Prime, white, 99%, carlots, 4.00c lb.

**Beryllium-Copper:** 3.75-4.25% Be, $14.75 lb contained Be.

**Cadmium:** Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

**Cobalt:** 97-99%, $1.50 lb., for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

**Indium:** 99.9%, $2.25 per troy ounce.

**Gold:** U. S. Treasury, $35 per ounce.

**Silver:** Open market, N. Y. 70.625 per ounce.

**Platinum:** $35 per ounce.

**Palladium:** $24 per troy ounce.

**Iridium:** $165 per troy ounce.

## Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lb or more.)

**Sheet:** Copper 23.44c; yellow brass 22.09c; commercial bronze, 90% 23.68c, 95% 23.89c; red brass, 80% 22.76c, 85% 22.97c; phosphor bronze, grades A and B 5%, 41.20c; Everdur, Herculoy, Duronze or equiv., 28.61c; naval brass 27.11c, manganese bronze 30.61c; muntz metal 25.36c; nickel silver 5% 30.69c.

**Rods:** Copper, hot-rolled 19.79c; cold-drawn 20.79c; yellow brass 17.06c; commercial bronze 90% 23.37c, 95% 23.58c; red brass 80% 22.45c, 85% 22.66c; phosphor bronze grades A and B 5% 41.45c; Everdur, Herculoy, Duronze or equiv., cold-drawn, 27.55c; naval brass 21.17c; manganese bronze 24.55c; muntz metal 20.92c; nickel silver 5% 32.94c.

**Seamless Tubing:** Copper 23.48c; yellow brass 24.85c; commercial bronze 90% 26.09c; red brass 80% 25.42c, 85% 25.63c.

**Extruded Shapes:** Copper 23.29c; architectural bronze 21.17c; manganese bronze 26.05c; muntz metal 22.17c; naval brass 22.42c.

**Angles and Channels:** Yellow brass 30.59c; commercial bronze 90% 32.18c; red brass 80% 31.26c, 85% 31.47c.

**Copper Wire:** Base prices on bare, weatherproof and magnet wire withdrawn pending issuance by manufacturers of new price lists conforming to amendment 7 to maximum price regulation 82, effective as of May 8, 1946.

**Aluminum Sheets and Circles:** 2s and 3s flat mill finish, base 30,000 lbs. or more del.; sheet widths as indicated; circle diameter 9" and larger:

| Gage | Width | Sheets | Circles |
|---|---|---|---|
| .249"-7 | 12"-48" | 22.70c | 25.20c |
| 8-10 | 12"-48" | 23.20c | 25.70c |
| 11-12 | 26"-48" | 24.20c | 27.00c |
| 13-14 | 26"-48" | 25.20c | 28.50c |
| 15-16 | 26"-48" | 26.40c | 30.40c |
| 17-18 | 26"-48" | 27.90c | 32.90c |
| 19-20 | 24"-42" | 29.80c | 35.30c |
| 21-22 | 24"-42" | 31.70c | 37.20c |
| 23-24 | 3"-24" | 25.60c | 29.20c |

**Lead Products:** Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

**Zinc Products:** Sheet fob mill, 13.15c; 36,000 lbs. and over deduct 7%; Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

## PLATING MATERIALS

**Chromic Acid:** 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

**Copper Anodes:** Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

**Copper Carbonate:** 52-54% metallic Cu, 250 lb. barrels 20.50c.

**Copper Cyanide:** 70-71% Cu, 100-lb kegs or bbls. 34.00c, fob, Niagara Falls.

**Sodium Cyanide:** 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c fob Niagara Falls.

**Nickel Anodes:** 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

**Nickel Chloride:** 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

**Tin Anodes:** 1000 lbs. and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

**Tin Crystals:** 400 lb. bbls. 39.00c fob Grasselli, N. J.; 100-lb. kegs 39.50c.

**Sodium Stannate:** 100 or 300-lb. drums 36.50c, del.; ton lots 35.50c.

**Zinc Cyanide:** 100-lb. kegs or bbls. 33.00c fob Niagara Falls.

## Scrap Metals

**Brass Mill Allowances:** Prices for less than 15,000 lbs. fob shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 or more.

| | Clean Heavy | Rod Ends | Clean Turnings |
|---|---|---|---|
| Copper | 10.250 | 10.250 | 9.500 |
| Tinned Copper | 8.75 | 8.75 | 8.00 |
| Yellow Brass | 8.625 | 8.375 | 7.875 |
| Commercial bronze | | | |
| 90% | 9.375 | 9.125 | 8.625 |
| 95% | 9.500 | 9.250 | 8.750 |
| Red Brass, 85% | 9.125 | 8.875 | 8.375 |
| Red Brass, 80% | 9.125 | 8.875 | 8.375 |
| Muntz Metal | 8.000 | 7.750 | 7.250 |
| Nickel Sil, 5% | 9.250 | 9.000 | 4.625 |
| Phos. br., A, B, 5% | 11.000 | 10.750 | 9.750 |
| Naval brass | 8.250 | 8.000 | 7.500 |
| Mang. bronze | 8.250 | 8.000 | 7.500 |

**Other than Brass Mill Scrap:** Prices apply on material not meeting brass mill specifications and are fob shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) Soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) Admiralty condenser tubes, brass pipe, 7.25c; muntz metal condenser tubes 6.75c; old rolled brass 6.75c; manganese bronze solids: (lead 0.00%-0.40%) 5.50c; (lead 0.41%-1%) 4.50c; manganese bronze borings: (lead 0.00%-0.40%) 4.00c; (lead 0.41%-1%) 3.00c.

**Aluminum Scrap:** Price fob point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

**Lead Scrap:** Prices fob point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

**Zinc Scrap:** New clippings 6.50c, old zinc 4.75c, fob point of shipment, add ½c for 10,000 lb or more. New die cast scrap 4.45c, radiator grilles 3.50c, add ½c for 20,000 lb or more. Unsweated zinc dross, die cast slab 5.30c, any quantity.

**Nickel, Monel Scrap:** Prices fob point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

**Nickel:** 98% or more nickel and not over ½% copper 23.00c; 90-98% nickel, 23.00c per lb nickel contained.

**Cupro-nickel:** 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

**Monel:** No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

## Sheets, Strip . . .

Sheet & Strip Prices, Page 164

In spite of preferential treatment given sheet mills in the effort to go as far as possible in meeting the heavy demand and to assure material for tin plate production, carryovers into third quarter are heavy. In some cases these will absorb at least half the quarter's output, leaving little additional tonnage to be distributed under quotas. Sheet fabricators are operating on restricted basis and face probable shutdown in many cases, because of lack of material.

**New York**—Some leading sheet producers, who are now setting up quotas for the third quarter, assert they will have a carryover of six to eight weeks at the end of the current quarter, on the basis of present prospects, which means they will have no more than one and a half month's production at the outside to apply to new allocations, with the possibility they may have less.

With consumer inventories already low, it appears that sheet fabrication will continue on a restricted basis for some time. Some who have not already been forced to do so, will undoubtedly shut down completely for a period, applying perhaps at least a portion of the time to vacations.

**Chicago**—Sheet demand remains insistent and tremendous despite interruptions to production as a result of the coal and rail strikes. The new stoppage in mining came as a further threat. One local mill, however, planned to close down all rolling mills except sheet mills late last week if forced to curtail operations because of growing coal shortage. This choice was arranged not because sheets are the tightest of all steel products but because gas requirement of sheet mills are less than for other mills. Some warehouses handling seconds and devoid of stocks have been seeking mill shearings of inferior quality.

**Philadelphia** — Sheet sellers are far oversold as a result of labor disruptions, with some endeavoring to bring their position in balance by the beginning of fourth quarter, which means they probably will have no more than four to five weeks production to allocate in third quarter. In view of this situation and scarcity of copper and other materials, many consumers will operate on a limited scale for some weeks.

**Cleveland** — Some users of sheet and strip in this district will be forced to curtail operations further unless mills can make substantial shipments soon. The position of consumers varies widely because mills of some suppliers are completely closed while those of others have maintained a fairly high rate of production. Indications are that rolling mills will not be able to attain normal production until the final week of June at the earliest and that a large portion of May and June output will be lost. While the position of mills will not be definitely known until about mid-June, it is clear that orders already accepted are in excess of the industry's capacity over the balance of the year and in some instances will not be filled until late in first quarter. In addition to this carryover, many sellers have received substantial orders for 1947 delivery which have not been processed since books for that period have not been opened.

**Boston** — Narrow cold strip schedules are in confusion, with production erratic; deliveries of hot strip are down and unpredictable over the next few weeks, as in case of most other flat-rolled products. There are curtailments among fabricators because of lack of steel. Mills are centering production in tin plate gages, cold-rolled and hot-rolled, in that order; the former takes a large share of the limited semifinished available and hot-rolled is especially short. Consumers are in need of galvanized and some are drawing on limited stocks of cold-rolled for commercial galvanizing, paying up to $60 per ton for hot dipping. Carryover from second quarter in flat-rolled will be especially heavy and recasting of schedules may mean August before the large accumulation of orders will eventually find a place for later processing. Meanwhile orders are piling up with no place to go until the confusion is clarified and production in volume is resumed. Supply for steel fabricators is growing progressively worse and if it is not steel, copper or some other component is short. The result is shorter work weeks, curtailments, start of earlier vacations and in some cases shutdowns.

**Birmingham**—Inquiry for sheets has dropped off, largely because of the apparent uselessness of attempting to place orders for anything like reasonably early delivery. Production of sheets is down somewhat and a larger proportion is going into tin plate. A fairly large tonnage of cotton ties is being produced.

**St. Louis**—With sheet and plate pro-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duction here at a standstill, with the machinists' strike in its twelfth week, carryover of orders now on mill books will extend well into second quarter of 1947.

## Steel Plates . . .

Plate Prices, Page 165

Plate mills are sold well through the year, many having nothing to offer, while others can take a little tonnage for late fourth quarter, though these promises may be upset by continued restrictions on production as fuel shortage continues. Pressure is strong, especially from warehouses and tank manufacturers, with shipyards also seeking plates to finish up their remaining contracts.

**New York**—Most plate producers now have little to offer over the remainder of the year; and some having nothing, as has been the case for the past month or so. Inquiry is still strong, especially from jobbers and tank fabricators. Even shipyards are pressing for tonnage in certain cases, despite the fact that their overall activities are still on the wane.

**Philadelphia**—During the past week two plate mills in the immediate Philadelphia district were down completely after operating the week before. One had only resumed production when forced down by the rail strike. A third district mill, after having been operating at a reduced rate, is scheduled to be down entirely during this week, applying the time to vacations.

Plate demand continues far greater than bookings, with most mills virtually covered for the remainder of the year and in general accepting nothing for delivery next year.

**Boston**—Plate fabricators who bought heavily in fourth quarter last year, in some cases from several mills, have been able to maintain production at relatively good rate but are becoming increasingly pinched for steel as production losses and extended deliveries develop at mills. Those who delayed buying, holding orders to known requirements, are short. Most mills now are filled through the remainder of this year on tank, flange and fire-box grades. Some openings have developed for ⅜-inch heads up to 22 inches, for shipment in 12 to 14 weeks, but this appears to be temporary. Demand for tank steel is notably heavy. A new inquiry for plates is for 3200 tons of ⅜ to ⅞-inch for a 48-inch water line for Springfield, Mass.

**Seattle**—Plate shops report a large number of jobs involving small tonnages, mainly boilers and tanks. Surplus plates from shipyards have been exhausted and replacements from eastern sources are indefinite. Many plants will be compelled to close soon unless new material arrives. Chicago Bridge & Iron Co. will erect the Magnolia Buff water tank and tower at Seattle, bidding low at $133,175. Dallas Tank Co., Dallas, Oreg., is low at $3486 for three oil storage tanks for Bonneville. The Navy has allocated $100,000 to build a base and install a 250-ton captured German crane at Puget Sound Navy Yard. James Construction Co., Seattle, is low at $188,537 for the Pasco, Wash., pumping plant, a unit of the Columbia Basin project.

**Birmingham**—Plate production is suspended in Birmingham proper and remained on a limited scale at Gadsden's Republic operations. Inquiry is substantial but not in the volume of a few weeks ago since most users have despaired of filling their needs. Tank manufacturers, well booked, are pressing for plates. At the moment, however, practically no tonnage is available.

## Steel Bars . . .

Bar Prices, Page 164

Bar production continues to decline while demand holds at a high rate, producers having little to sell in hot-rolled carbon bars this year. Some larger sizes may be placed for December delivery, though some mills cannot promise anything for this year. All bar consumers are pressing hard for deliveries, with little success. Hot-rolled alloy bars may be placed for July and August in some cases.

**New York** — Commercial bar production is at the lowest ebb since the steel strike, in the opinion of some trade leaders, with the possibility that there may be a further decline before improvement sets in. Meanwhile sellers have little to offer in hot-rolled over the remainder of this year. Some promises in the large sizes, ½-inch and over, are reported for late November and December, but certain producers cannot even accept business in these sizes for this year, and consequently are out of the market completely. Some sellers of cold-drawn can promise a little in the larger sizes for September delivery, but

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in general these sellers have little to offer before November and are out of the market for the year on small sizes. Hot alloy bars are being offered for July and August, with the few promises noted recently for June having disappeared.

Demand is strong in practically all directions, with jobbers unable to keep stocks in balance and with bolt and nut makers having extreme difficulty in maintaining current one-shift operations. These latter continue in receipt of far more business than they can handle, especially in small sizes of bolts and nuts.

**Philadelphia**—Leading sellers of hot-rolled carbon bars are out of the market for this year, except on some larger sizes; on smaller sizes they are oversold for ten to 12 weeks or more and expect a heavy carryover into 1947. Sellers of cold-drawn carbon bars are in almost as tight a position on small sizes.

**Cleveland**—Indecision regarding the effective date for the pending increase in alloy steel prices has delayed issuance of the official order by the Office of Price Administration. Some officials wanted to make it effective on the date the order is issued while others wanted to make it retroactive to Feb. 15. Since the latter date, when a 4 per cent increase was authorized, some producers have been billing at the old price with the proviso that a subsequent upward revision would be made in line with OPA's ultimate action; others have billed at the present maximum price level with the same proviso. Bar mill operations were sharply lower during May, although they held at a fairly high rate in some instances. The tonnage lost varied from as much as 75 per cent for some mills to as little as 5 per cent in others. Nonintegrated cold finishers began curtailing operations at the month end as their reserves of hot-rolled bars were dwindling rapidly.

**Boston** — Indications are that steel mills will have an eight-month production year in which to produce a full year's heavy volume and in small sizes of bars, carbon and cold-finished alloys, order books and deliveries reflect this; most mills are booked through 1946 and are taking little additional volume with definite promise of shipment. In larger sizes of cold-drawn rounds and squares one mill might make late third quarter, but most cold-drawn producers are short of hot-rolled carbon stock. Only hot-rolled alloys and stainless approximate nearby delivery. Most bar consumers, including textile mill equipment and forge shops, placed forward volume, generally on quotas, months back, and the primary objective has been to produce and ship against these orders in sufficient volume to maintain fabricators' schedules. Until recently most have been reasonably successful, but ground has been lost to the extent of a month to six weeks, with further extensions likely. Thus carryovers are mounting and firm acceptance of new business is uncertain. Most bar consumers could use more steel and in some instances the pinch for stock is becoming serious.

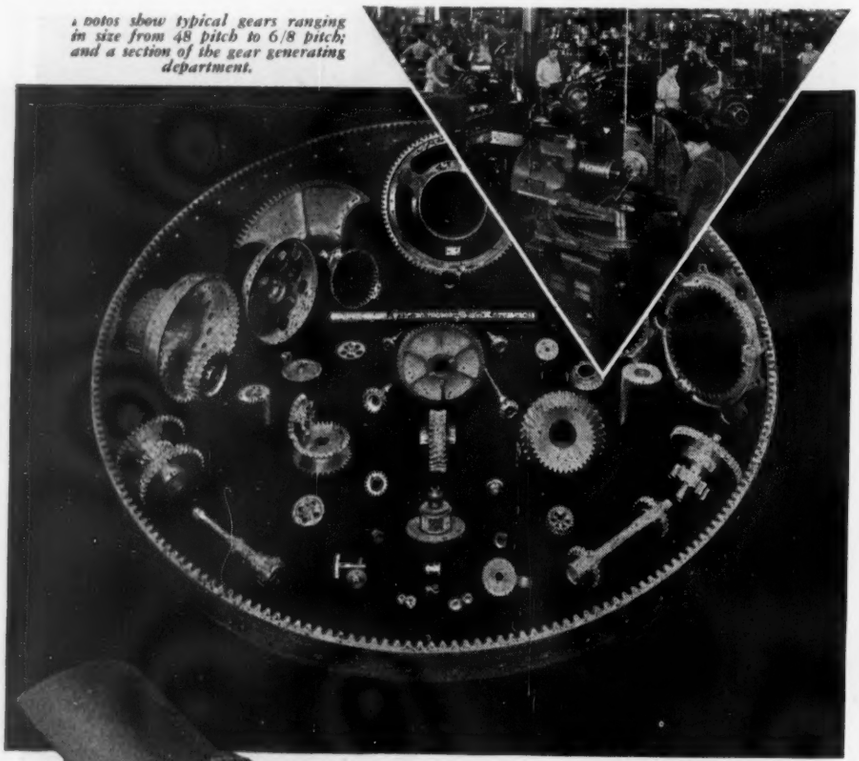
## Wire . . .

Wire Prices, Page 165

**Boston**—Unless price relief is forthcoming on wire rods production in this area will coptinue to suffer, with most mills off the Worcester base and a few parceling out restricted tonnage to old-time accounts. This tightness in rods is not likely to be remedied by higher production alone, for mills formerly selling rods in New England are drawing a greater ratio of finished wire, on which the margin is more attractive. In drawn wire the range of selectivity is narrowing both in grades and sizes, as indicated by low production of basic wire and nails, to mention only two of numerous finished wire products. District producers of rods are in no position to take care of the current demand and maintain finished operations against heavy backlogs. Overall production of both rods and drawn wire is down and there are layoffs, early vacations and curtailments among both producers and consumers. Obviously wire mill orders are in for another screening and shakeout.

**Pittsburgh**—Jobbers' stocks of fencing, nails and other items are nearly depleted in many instances, while prospect of increased production when the coal strike is terminated is not promising. Cement coated nails are in particularly short supply, with the housing program alone estimated to require about 15,000 tons. Current profit squeeze also has forced some sellers to limit new business to those areas involving a minimum freight absorption. There is an acute shortage of virtually all major classes of wire goods in relation to overall demand. Mills are


*Photos show typical gears ranging in size from 48 pitch to 6/8 pitch; and a section of the gear generating department.*



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booked well into fourth quarter on manufacturers' wire items and report continued heavy volume of new inquiries despite extended deliveries.

**Birmingham**—Even though wire continues to be turned out in comparatively substantial volume, demand far exceeds current and even potential supply. Farmers are begging for wire fencing which is not obtainable. Drawn wire needs have increased measurably in recent months, but most wire processers are hard put for even a portion of their normal requirements.

## Tin Plate . . .

Tin Plate Prices, Page 165

**Pittsburgh** — Tin plate production continues to get preference on available steel output at mills whose primary steel production has been slashed by effects of the coal strike. Although tin plate output has held up well throughout the strike, prospect of continued high production is not encouraging unless coal strike is terminated soon. The leading producer here, for example, will have to curtail output this week if strike is not settled. The fact producers now are able to reduce shipments on export accounts in the same proportion as to domestic consumers, should materially aid sellers in meeting heavy tin plate requirements for the domestic perishable food pack. Should the coal strike cut deeply into tin plate output, export directives likely will be pushed back into fourth quarter.

**Boston**—For the Maine sardine pack some tin plate is scheduled for June delivery and canmaking for this pack has already started. Practically no tin plate is available for industrial requirements.

## Tubular Goods . . .

Tubular Goods Prices, Page 165

**Boston** — Lost production at some pipe mills will extend deliveries on quotas up to three months; only in a few cases will extensions be less. Butt-weld pipe in smaller sizes is especially tight and distributor stocks in the faster moving range generally are small. A substantial tonnage of surplus steel pipe remains at Davisville, R. I., depot, including 625 tons of four-inch. Part of this is wanted by the Maritime Commission and all is frozen. A substantial volume of cast iron pipe to have been installed this year, for which orders are in, will not be produced in time because of the pipe iron shortage. The district foundry has a backlog approaching 14,000 tons. Industrial users of welded and seamless tubing are hard put to obtain sufficient to maintain operations. The leading pipe fabricator in the Providence district is down, lacking iron and short of steel components, including light galvanized sheets.

**Pittsburgh** — Much municipal work, scheduled to get under way this spring, must be postponed; because of shortage of pig iron most cast iron pipe producers have not been able to match projected production schedules. In some instances these interests are over two months behind on deliveries and booked through the remainder of this year. Pipe production schedules at steel producers and nonintegrated plants has been insignificant in recent weeks due to the coal strike. It will take four to five weeks following termination of the strike for production to reach normal, resulting in further drain on stocks of oil country goods and other pipe items. The Navy Material Redistribution and Disposal office here will take bids June 7 on about 1340 gross tons of scrap steel tubing located at the U. S. Naval Ordnance plant, South Charleston, W. Va.

**Cleveland** — Pipe production remains low, due to lack of steel. Some butt-weld pipe mills have been closed for two weeks and one large mill has operated only two or three days out of each week during May. Producers estimate that it will be at least ten days after end of the coal strike before sufficient skelp and strip can be accumulated to justify reopening of pipe mills. Several large pipeline orders are being withheld, as delivery on those already booked cannot be completed in some instances until second quarter of next year. One large producer has been out of direct shipment business since early in the year. Jobbers have not had an opportunity to warehouse much pipe so far this year, shipments from mills often being diverted directly to the customer. June quotas will be canceled or will be carried over into July which would require another reduction in monthly quotas.

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## Rails, Cars . . .

Track Material Prices, Page 165

**New York** — In spite of estimates that American railroads' requireements for freight cars are 80,000 to 100,000 annually, current orders are far short of the productive capacity of the carbuilding industry, according to the American Railway Car Institute.

Cars on order for domestic railroads as of May 1 totaled 29,869, while capacity of the industry is about 160,000 cars per year. The industry now has orders for 43,903 freight cars for export, to be built to foreign specifications, about half the size of domestic freight cars, or the equivalent of 21,950 domestic cars.

If materials were available capacity exists to produce the domestic orders now on hand in slightly more than two months and production of the foreign cars would require only about seven weeks.

Estrada de Ferro Sorocabana, Brazil, has placed an order with the United States Steel Export Co., New York, for approximately 8200 net tons of 100-pound steel rails, 400 tons of joint bars and 200 tons of tie plates. This is the first time this railroad has bought rails heavier than 90 pounds.

## Structural Shapes . . .

Structural Shape Prices, Page 165

**New York** — Estimated structural steel bookings for April amounted to 115,987 tons, an increase of 5 per cent over the average April bookings for the five prewar years, 1936-1940, according to the American Institute of Steel Construction. Shipments during April of 110,420 tons were the highest for the year, but were 10 per cent less than the average prewar average for April. Tonnage available for future fabrication as of April 30 had increased to 673,979 tons.

**Pittsburgh**—Recent structural awards include 400 tons for alterations and additions to buildings at Vandergrift, Pa., and 200 tons for trestle repairs at Rankin, Pa., both for Carnegie-Illinois Steel Corp., placed with American Bridge Co. Bethlehem Steel Co. has booked 300 tons from Rust Engineering Co., Pittsburgh, for a $400,000 plant and warehouse at Chicago, for Diamond Alkali Co., Pittsburgh. Structural projects approved by CPA in the week ended May 23, included an extension to steel mill at Bethlehem Steel Co.'s Johnstown, Pa., plant, estimated to cost $511,000. Only 61 out of the 577 proposed structural projects screened by local CPA officials have been turned down in the period from April 2 to May 23. Present reduced mill output has extended mill order backlogs well into fourth quarter on most structural items.

**Boston** — Deliveries on fabricated structural steel range to December and beyond on medium sized projects and larger shops are behind schedule. Backlogs of the largest interest are heavy and distribution of tonnage among shape mills is unbalanced. Lighter sections predominate. Sufficient supply of semi-finished is the big question in recovery of structural mill operations. Telephone building extensions account for a substantial tonnage and approximately 800 tons for the Wyman and Winslow crossing in Maine, previously placed but held up, have been released. American Bridge Co. will erect this steel. Strike of junior engineers and draftsmen employees of the Stone & Webster Engineering Corp. has ended, an important factor in holding back a large tonnage of structural steel.

**Chicago** — Some new inquiry for structural steel continues to come out, particularly from railroads, and manufacturers have a good chance of gaining CPA approval. Tonnages involved are not large, but in spite of this, fabricators show little interest. Projects on which bids are submitted are chosen carefully. Several awards were made within the past week, but most represented business on bids taken some time ago. The situation is not likely to show improvement for some time.

**Seattle** — Fabricating shops are drawing on material inventories and unless replacements are received soon will be compelled to close. Under the circumstances they are unable to bid on major pending projects. Many small jobs are being taken and shops generally are busy, though the future is not promising. Southwest Welding & Mfg. Co., Alhambra, Calif., is low to Bureau of Reclamation, Denver, for fabricating 1188 trash racks for Coulee Dam. American Bridge Co. is low at $11,205 for furnishing steel for Anderson Ranch Dam warehouse.

## Reinforcing Bars . . .

Reinforcing Bar Prices, Page 165

**Chicago** — Inquiry for reinforcing steel has dropped to almost nothing in the past few days, except for lots of only a few tons each. This is a reflection of the small amount of steel available and also of psychology resulting from the acute shortage of construction materials. Contractors for the most part will accept work only on the basis of cost plus, the rising costs of materials and labor making any other form of bidding impractical. In some instances, also, contractors are asking prospective builders to acquire their own materials, presumably because industrial concerns may have more influence with steelmakers than have the contractors.

**Boston**—Nearby stocks of reinforcing bars are light and most material on hand has already been sold. Tonnage from mills has been on the decline for some time, due to small production. Some active inquiries, which aggregate under 1000 tons, are for bridge and highway construction and attract slight interest.

**Seattle** — Rolling mills report unchanged schedules, with heavy backlogs and promise of a long active period. Many small orders are being placed, buyers demanding quick delivery. Bethlehem Pacific Steel Co. has booked 3500 tons of reinforcing for new piers at Puget Sound Navy Yard. Pending tonnages include 5500 tons for the left Coulee power house and 361 tons for a warehouse at Coulee, bids opened by Bureau of Reclamation at Denver May 29; 130 tons of reinforcing for the Willamette national forest project, bids to Bureau of Roads, Portland, Oreg., June 4; unstated tonnages for Washington state highway bridges; unstated for navy piers at Tacoma, Manson Construction & Engineering Co., Seattle, low.

## Pig Iron . . .

Pig Iron Prices, Page 167

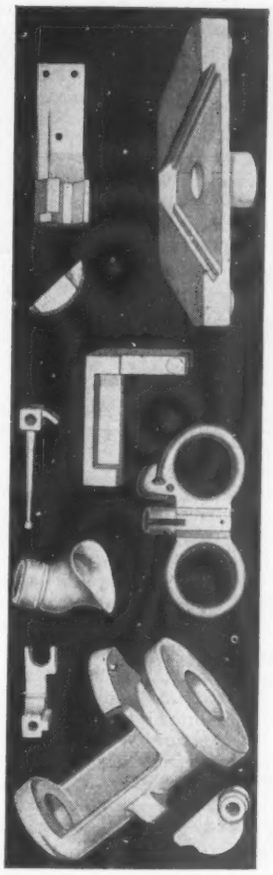
Pig iron supplies are dwindling as blast furnaces continue to blow out as coke supply is exhausted. Little prospect of better conditions has appeared and continued short soft coal supply holds back coke production. Foundries in many cases find lack of coke more of a deterrent than short pig iron supply. Decline of production in May is considered heavy, with some slight hope output may gain in June. More blast furnaces are being banked each week.

**New York** — Pig iron shipments are at a low ebb, with production of furnaces supplying this district at the lowest point since February. A number of consumers have had to curtail their melt considerably, in some instances completely, and prospects for any material improvement in the immediate future are dim. An added deterring factor is shortage of coke. Some consumers, in fact, regard coke as a greater bottleneck at the moment than pig iron, although shortage of the latter is likely to have a more disturbing effect over the long run. Estimates as to how much the melt has declined in May are lacking, but the loss is generally regarded as having been appreciable. June may see some improvement, but there appears to be little likelihood that it will bring production back to anywhere near the April level.

**Pittsburgh** — To insure continued shipment of pig iron pending determination of a permanent price increase, it is reported OPA soon will announce a revision in the price regulation permitting producers to ship iron on an adjustable pricing basis. Another price rumor is to effect premium payments may be allowed on pig iron and other critically short materials for the housing program, to stimulate production of these items by marginal producers.

Many foundries are shutting down, due to shortage of iron and coke. There is a growing belief some form of pig iron allocation system soon may be put into effect to aid key reconversion programs. Such a program has been carried out with CPA officials in the Chicago district in recent months, but in other areas distribution of iron has been on a voluntary company basis with regular customers. Even should the coal strike be terminated soon, pig iron supply through the remainder of this year is expected to fall far short of urgent needs of many important reconversion programs. At the close of last week only 13 out of 54 blast furnaces here were in operation, many of these on reduced blast. The one merchant producer was able to obtain a small tonnage of coal recently and therefore will be able to continue operation through most of this week instead of having to bank its furnace on May 26, as earlier expected.

**Cleveland** — Foundries are short of raw materials and a few are uncertain of maintaining operations for more than a few days ahead. One foundry, for instance, had only a few days' supply of sea coal on hand last week and was awaiting a truck shipment of corn products to use as a substitute. Others were extremely short of coke and were unable to get promises of early shipments. Supplies of pig iron were being

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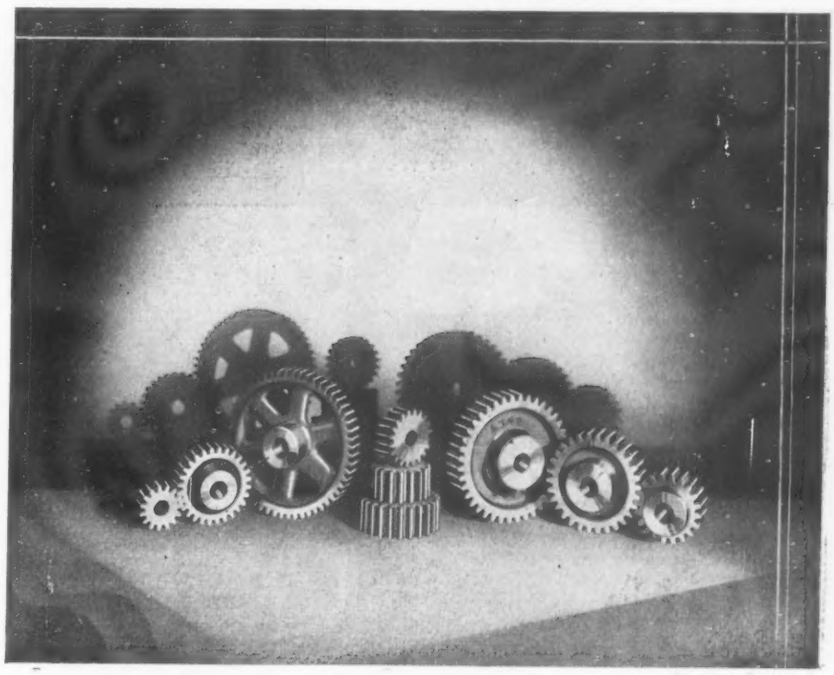

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depleted rapidly in many foundries, even though operations generally have been reduced to a five-day basis. With many blast furnaces banked or on reduced draft, shipments of pig iron cannot be resumed in volume for at least a week to 10 days after the miners return to work.

**Chicago** — With settling of the railroad strike, foundries find themselves back about where they were before the two-week coal truce went into effect. After they receive the iron, coke and other supplies delayed 48 hours or more by the halt in transportation, they see no prospects for increased shipments until mining is resumed. Operation of foundries is spotty, depending upon inventories of individual shops. At the start of last week, operating blast furnaces in the district totaled 18, same as the week before, but prospects are that some bankings may occur shortly. Scrap is almost as difficult to obtain as iron and coke, so there can be no relief from this direction.

**Boston** — The most critical period in supply of pig iron is expected 30 days after production is resumed. Practically all inventories will be depleted and all consumers will be wanting iron at the same time. Hardly more than 30 per cent of tonnage to have been delivered in this area in second quarter will be shipped, reflected in the added number of foundries down and general curtailment in melt by others, including steelworks. So short are supplies that nearly 1500 tons of ballast iron of poor grade has been sold in New England. Prospects for delivery by barge in the near future are dim. Furnaces in the Buffalo district for some time will not be able to accumulate lots of 1500 to 2500 tons for barge loading, due to intense demand for spot emergency delivery. Boats have already been canceled. New England Foundrymen's Association held a special meeting last week to consider the short supply situation. Arrival of nine cars of basic for one steel works from Buffalo has temporarily prevented further curtailment in melt.

**Philadelphia** — With supplies short, various foundries shut down for a long week end, beginning the day before Memorial Day. This even included some soil pipe makers, who are being pressed to the limit in meeting requirements of the national housing program. Coke is proving a greater bottleneck than pig iron in some instances. Reports persist that some further price relief will be granted pig iron producers soon, with invoices to be made out with provision allowing for an increase to be named later and made retroactive as of a given date, such as now applies in by-product coke.

**Birmingham** — The pig iron situation is confused. Production costs, melters declare, are out of line with selling prices. Coal shortage has further complicated the picture and the overall needs of this territory are greater than they have ever been. Result is the most critical district-wide shortage of pig iron yet recorded and with not much relief in prospect.

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## Scrap . . .

Scrap Prices, Page 168

Industrial scrap supply, normally an important factor in the scrap market, continues to decline as steel users operate at diminishing rate on reduced volume of steel. In fact, practically all sources of scrap show smaller output and while consumption is much reduced demand continues heavy as melters seek to build reserves for the day when steelmaking tends toward normal. There seems no limit to added cost of obtaining supplies from remote areas. Only on the Pacific Coast is the supply sufficient for needs.

**Pittsburgh** — While unusual heavy demand for all scrap grades continues, the volume of industrial scrap available is steadily drying up as many metalworking companies taper production to conserve rapidly dwindling steel inventories. Crushers are operating on a day-to-day basis, with yards frequently bare of a single car of turnings. Most scrap produced by automotive interests is absorbed within a short radius of their plants, while railroads are far behind delivery schedules on recent offerings and apportioning scrap carefully. Some steel mill interests characterize the present scrap market as the tightest in many months and this situation likely will become more critical when mills resume operations for it will be a month to six weeks before significant steel tonnage will reach consumers. Shortage of pig iron has accentuated the cast scrap shortage and is reflected in freight absorption of up to $6 a ton. Heavy melting steel and turnings generally command a $2.50 per ton freight equalization.

**New York** — Despite limited consumption, resulting from the coal shortage, scrap demand continues highly active. Where the material is not needed for immediate consumption it is being purchased for storage, as consumers generally believe it will be some time before pig iron production will again be anything like normal. Moreover there is a general feeling that scrap values not only will hold but may be increased within the course of the next few weeks. Consequently consumers believe they have at least nothing to lose by building up stocks.

Shipments have again become normal, following the few days tie-up resulting from the rail strike. As a matter of fact, there was relatively little accumulation of scrap as a result of the walkout.

**Chicago** — Demand for scrap slackened only momentarily while waiting for settlement of the railroad strike. It became heavy again last week despite closing of coal mines following the truce, a situation which not only threatens curtailment of steelmaking, but promises to reduce production of scrap in manufacturing plants. Unable to obtain adequate supplies of steel and other raw materials, industrial plants are gradually scaling down their operations. With hot metal supply restricted by banked blast furnaces, steelmakers are placing greater dependence upon scrap. Foundry scrap is extremely scarce. Except for alloys, some not wanted at all, scrap commands ceiling prices.

**Philadelphia**—Scarcity in scrap is becoming still more pronouced, for despite reduced consumption, due to labor dis-

turbances, consumers are pressing for all the tonnage they can get, in an effort to build up inventories and also in some cases actually to keep operations going from day to day. Shortage of pig iron and the likelihood than it will continue for some time is contributing to the urgency. While there is some speculation as to when and how much scrap prices might be advanced, in view of the rising trend in many commodities, it is known that no application for higher scrap prices is before OPA at present.

**Boston** — Buying and shipment of heavy melting steel and cast scrap are in excess of supply, although melt is off because of lack of pig iron. Resumption of coal mining is not expected to ease scrap demand immediately, as most consumers seek to build reserves beyond current levels. In this they are hampered by limited supply. Press operations are spasmodic, due to uneven flow of industrial scrap, production of which is down, and to inactive automobile wrecking.

**Birmingham**—Industrial and railroad scrap have practically vanished. Even with steel production at the lowest point in years demand continues, with mills taking whatever they can get, but there is little to be had. Some dealers, it is reliably reported here, are holding back limited tonnage for OPA price consideration.

**St. Louis** — Scrap shipments came to a standstill when the railroad strike started, no effort being made to move material by truck. Collecting points piled scrap for quick shipment when railroad service was renewed. Stoppages did not affect steel production as reserves up to about 30 days were on hand. The principal sheet and plate producer continues down because of a strike and two large foundries are idle from lack of fuel.

**Seattle** — The local scrap situation is satisfactory, except for the interruption by the railroad strike. The recent price rise to ceiling has loosened the situation and larger receipts are coming from greater distances. Inventories are normal and mills have been receiving ample supplies to offset expected larger production.

## Warehouse . . .

Warehouse Prices, Page 166

**St. Louis** — Demand for steel from warehouse developed a spurt when the railroad strike started, depleting already low inventories. Most orders were of a size beyond ability of warehouses to fill. Warehouse tonnage is fair but assortments are broken. Light plates, galvanized sheets and light hot-rolled sheets are almost unobtainable. Standard structural sections up to 10-inch in beams and channels are scarce. A few heavier plates, cold-rolled carbon bars and cold-rolled sheets are available.

**Pittsburgh** — Despite concerted effort to ration dwindling warehouse steel supplies, an increasing number of customers have been forced to shut down because of scarcity of steel. Warehouse steel inventories are lowest on record and supply outlook is not promising as it will take over a month on some products before mills could regain normal operation following termination of the coal strike. In effort to bring production schedules up to date some mills have requested warehouse interests to cancel tonnage scheduled for April and May

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delivery. Indicative of this large mill carryover one distributor reports receipt of some sheet tonnage recently that originally was promised last September. Most distributors have a moderate tonnage of plates and alloy items still in stock, but inventories of small structural and carbon bar items, galvanized and light-gage hot and cold-rolled sheets are depleted. Volume of new inquiries has eased substantially in recent weeks, as consumers have become cognizant that steel is not available.

**Chicago** — The warehouse situation is deteriorating through the recent serious strikes. The coal strike was and again is holding down mill production, and the rail strike delayed shipments that were in transit. With end of the coal truce and the new walkout of mine workers, fear is expressed that reduced rail service and embargoes may wreak havoc in future deliveries. Warehouses selling seconds and lacking supplies are seeking to obtain mill shearings to have some material to sell.

**Philadelphia**—Jobbers report declines in their daily average for May of 10 to 20 per cent. This is ascribed principally to the drop in incoming shipments. They expect some improvement this month but believe business will fall short of the April daily average.

**Boston**—Short of sizes in products most in demand, with receipts of steel below usual level, warehouse volume has declined notably in flat-rolled and small carbon bars, light-gage plates and strip. Structural shapes also are limited in supply. Only alloys, floor plates and bolts and nuts are ample to meet demand, which is rather slow for these products.

## Iron Ore . . .

**Iron Ore Prices, Page 166**

Breakdown of the tonnage of Lake Superior iron ore shipped in 1945 has been issued by the Lake Superior Iron Ore Association, Cleveland. Of the 75,206,781 gross tons moved last year low phos nonbessemer ore accounted for 54,089,368 tons, bessemer ore 13,538,811 tons, high phos nonbessemer 4,271,420 tons, manganiferous 2,693,675 tons and siliceous 613,507. These figures include shipments from all ranges in the United States.

From the Michipicoten range in Canada 461,974 tons of bessemer sinter were shipped and Steep Rock mines, also in Canada, contributed 485,118 tons of bessemer.

The bessemer ore from United States mines averaged 55.14 per cent in natural iron, the low phos nonbessemer 51.63 per cent, high phos nonbessemer 51.41 per cent, manganiferous ore 42.99 per cent and siliceous 37.25 per cent. The manganiferous ore averaged 5.46 per cent manganese and the siliceous 41.96 per cent silicon. The Michipicoten ore averaged 50.42 per cent natural iron and the Steep Rock 53.27 per cent.

## Steel in Europe . . .

**London** — *(By Cable)* — Government decision to nationalize certain sections of the iron and steel industry has been approved by House of Commons. The plan includes pig iron and steel ingot manufacture and spun pipe foundries but not iron castings.

## STRUCTURAL SHAPES . . .

### STRUCTURAL STEEL PLACED

1300 tons, Firestone memorial library, Princeton, N. J., from Turner Construction Co., to American Bridge Co., Pittsburgh.

1264 tons, tainter gates, John Martin dam, Caddoa, Colo., for U. S. Bureau of Reclamation, to American Bridge Co., Pittsburgh.

400 tons, alterations and additions to buildings, for Carnegie-Illinois Steel Corp. at Vandergrift, Pa., to American Bridge Co., Pittsburgh.

300 tons, warehouse for Charles Lessing & Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, trestle repairs, for Carnegie-Illinois Steel Corp. at Rankin, Pa., to American Bridge Co., Pittsburgh.

200 tons, warehouse, Columbia Falls, Mont., for U. S. Bureau of Reclamation, to American Bridge Co., Pittsburgh.

200 tons, expansion, Minneapolis, for Minneapolis-Honeywell Regulator Co., to American Bridge Co., Pittsburgh; C. F. Haglin & Sons Inc., Minneapolis, contractor; bids May 8.

200 tons, Luthe Hardware building, Des Moines, to American Bridge Co., Pittsburgh; Weitz Co. Inc., Des Moines, contractor.

150 tons, repairs, bridge 189-34, Vincennes, Ind., for Baltimore & Ohio railroad, to American Bridge Co., Pittsburgh.

135 tons, bridge 557.5 and repairs, Parsons, Kans., for Missouri, Kansas & Texas railroad, to American Bridge Co., Pittsburgh.

100 tons, generator station for Luzerne County Gas & Electric Co., to American Bridge Co., Pittsburgh, through United Engineers & Constructors, Philadelphia.

100 tons, repairs to coaling station for Reading Co., Reading, Pa., to Welding Engineers, Norristown, Pa.

### STRUCTURAL STEEL PENDING

1000 tons, paper mill, Pensacola, Fla., for L. Morris Mitchell.

650 tons, regulation gate for spillway, Davis dam, Louise, Ariz., for U. S. Bureau of Reclamation.

600 tons, bridges, New Mexico and various locations, for Atchison, Topeka & Santa Fe railroad.

600 tons, sheet and H-piling, breakwater pier heads, Keweenaw waterway, Houghton, Mich., for U. S. Engineer, Duluth; Great Lakes Dredge & Dock Co., Chicago, sole bidder and bid 70 per cent over estimate; bids May 21.

600 tons, branch store at Manhasset, L. I., for B. Altman & Co., New York; Vermilya Brown, 110 East 42nd St., engineer.

540 tons, power station, Lansing, Iowa, for Interstate Power Co.

460 tons, factory building, Chicago, for Armstrong Bros. Tool Co.

450 tons, plant remodeling for Western Electric Co., Kearney, N. J.; United Engineers & Constructors, Philadelphia, receiving bids.

400 tons, six bridges, for U. S. Engineer, Tacoma, Wash.

350 tons, plant expansion, Eliot, Calif., for Pacific Coast Augrate.

350 tons, transmission towers, Pennsylvania Power & Light Co., Allentown, Pa.

300 tons, buildings 78 and 82, Laporte, Ind., for Allis-Chalmers Mfg. Co.; bids May 20.

300 tons, for machine shop addition for Kennedy-Van Saun Mfg. & Engineering Co., Danville, Pa.; bids asked.

293 tons, bridge, Polk county, Iowa, for state highway commission; bids May 28.

275 tons, Memorial Hospital, Worcester, Mass.

150 tons, generator house, Citizens Gas & Electric Co., Indianapolis; United Engineers & Constructors, Philadelphia, taking bids.

150 tons, bridge, Ainsworth, Iowa, for Chicago, Rock Island & Pacific railroad; bids May 6.

135 tons, lighting towers, Fenway Park, Boston.

Unstated, 11 structures for Crown-Zellerbach Corp., pulp and paper plant, Camas, Wash.; $11 million project approved; bids soon.

Unstated, warehouse Anderson Ranch dam, Idaho; American Bridge Co. low at $11,205.

Unstated, 1188 trash racks for Coulee powerhouse; Southwest Welding & Mfg. Co., Alhambra, Calif., low at $285,120.

## REINFORCING BARS . . .

### REINFORCED BARS PLACED

3500 tons, piers at Puget Sound navy yard, to Bethlehem Pacific Steel Co., Seattle.

150 tons, Tribune Square building, Chicago, for *Chicago Tribune*, to Ceco Steel Products Corp., Cicero, Ill.; R. C. Wieboldt Co., Chicago, contractor.

### REINFORCED BARS PENDING

6500 tons, sewage plant, Chicago, for Sanitary District of Chicago; M. J. Boyle & Co., Chicago, low on general contract; bids May 23.

5861 tons, left powerhouse and warehouse at Coulee dam; bids opened at Denver May 29.

500 tons or more, Washington state highway projects; bids in but no action taken; may readvertise.

Unstated, navy layup piers, Tacoma; Manson Construction & Engineering Co., Seattle, low at $682,000.

## PLATES . . .

### PLATES PLACED

190 tons, pressure holder, Morris, Ill., for Public Service Co. of Northern Illinois, to Chicago Bridge & Iron Co., Chicago.

Unstated, water tank and tower, Magnolia Bluff, Seattle, to Chicago Bridge & Iron Co., Chicago, at $133,175.

Unstated, three storage tanks for Bonneville, to Dallas Tank Co., Dallas, Oregon, at $3486.

Unstated, 500 refrigerator cars for Western Fruit Express to Pacific Car & Foundry Co., Seattle

### PLATES PENDING

3200 tons, five miles of 48-inch pipe, Springfield, Mass.; bids in, contractor's letting.

300 tons or more, 7880 feet 12-inch water pipe; bids to R. C. Doty, Beaverton, Oreg., June 11.

## RAILS, CARS . . .

### RAILROAD CARS PLACED

Union Pacific, 15 sleepers, to American Car & Foundry Co., New York.

Wabash, four sleepers; to American Car & Foundry Co., New York.

### RAILROAD CARS PENDING

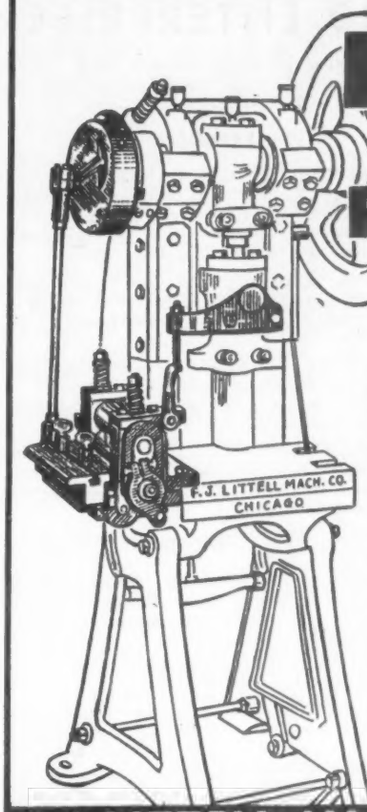
Atlantic Coast Line, on behalf of itself and the Pennsylvania, the Richmond, Fredericksburg & Potomac and the Florida East Coast railroads, 71 sleepers, 30 passenger coaches, 13 diners and three baggage cars; bids June 4.

Delaware, Lackawanna & Western, 1000 fifty-ton hoppers and 500 fifty-ton box.

Great Northern, five miscellaneous coaches.

Union Pacific, 1000 fifty-ton box and 500 fifty-ton auto box.

Youngstown Sheet & Tube Co., Youngstown, 16 thirty-yard air dump cars.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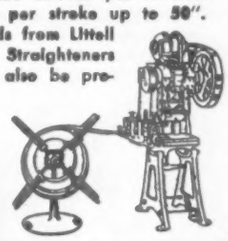
ROLL FEEDS

*At left*—Standard Style "M" Littell Roll Feed, equipped with a 3-roll Straightener, mounted on left-hand side of an O.B.I. press, feeding left to right. *Below*—same unit, including Littell Automatic Centering Reel.

FASTER production, better quality, lower costs, are assured with LITTELL Style "M" Roll Feeds—sturdy, efficient units that keep plant schedule going. Automatic in operation, they protect workmen's hands and lower insurance rates. Hardened and ground feeding rolls. Positive, silent roller drive for high speed, accuracy and durability. Two-piece driving disc, convenient feed adjustment and calibrated feed.

LITTELL Roll Feeds are made in Single- and Double-Roll types, for stamping, blanking, cupping, drawing operations. Capacities and models for handling stock up to .156" thick by 30" wide. Speeds, 50 to 200 strokes per minute. Length of stock advance per stroke up to 50". Stock usually fed to feeds from Littell Reels or Coil Cradles. Straighteners and Scrap Winders can also be provided.

REQUEST BULLETINS



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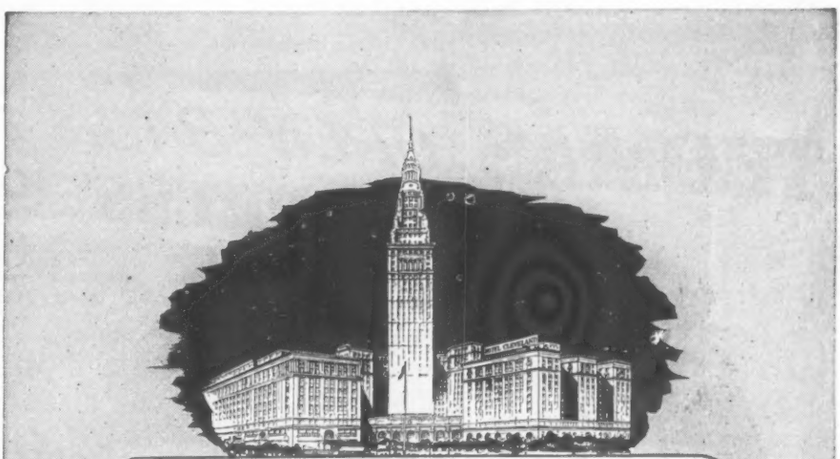

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# CONSTRUCTION AND ENTERPRISE

## CALIFORNIA

LAWNDALE, CALIF.—Lawndale Engineering & Mfg. Co. has been formed by Dan Freeman Sr. and has established operations at 16118 Hawthorne Ave.

LOS ANGELES—O'Keefe & Merritt Co., manufacturer of gas ranges and gas appliances, has bought 17-acre site in Maywood, Los Angeles suburb, and will build sheet steel mill with capacity of 50,000 tons per year.

LOS ANGELES—Steel Products Mfg. Co. has let contract to J. P. Stein, 1116 West Temple St., Los Angeles, for a plant building 80 x 230 feet. Plans are by Saul H. Brown, architect, and W. D. Treadway, engineer, 2412 West Seventh St.

LOS ANGELES—Vulcan Pipe & Engineering Co. is building a steel fabricating plant and crane runway at 10209 South Alameda St., to cost about $56,000.

LOS ANGELES—California Brass Co. is erecting a plant building 39 x 55 feet at 1447 Naud St., to cost about $6000.

LOS ANGELES—Thomas H. Ellis, 1310 Valencia St., is building a machine shop 35 x 135 feet at 3130 Hill St., to cost about $15,000.

LOS ANGELES—Central Tool Co. is erecting a plant building at 3525 East 25th St., 40 x 98 feet, to cost about $9000.

LOS ANGELES—G. B. S. Tool & Die Mfg. Co. has been organized by Anton J. Greenfield and associates and has established its operations at 10724 Santa Monica Blvd.

LYNWOOD, CALIF.—Lincoln Machinery Co is building two shop structures at 11813 Alameda St., to cost about $6000.

MONTEBELLO, CALIF.—Union Iron & Steel Co. is building a new plant structure 78 x 1000 feet at 7300 Telegraph Rd., to cost about $200,000.

SAN DIEGO, CALIF.—Western Metal Supply Co. will build a one-story warehouse building 150 x 200 feet at Eighth and L Sts.

## FLORIDA

JACKSONVILLE, FLA.—Clyde Steamship Co., foot of Liberty St., has plans for warehouses, terminals, offices and docks costing about $2 million. Reynolds, Smith & Hills, 10 South Laura St., are consulting engineers.

MIAMI, FLA.—City, C. S. Nichols, city engineer, City Hall, has plans completed for a sewage disposal plant costing about $6 million.

PENSACOLA, FLA.—Alabama Pulp & Paper Co., J. H. Allen, president, has plans for a paper and pulp mill near city, estimated to cost $12 million.

TALLAHASSEE, FLA.—City has plans by Wiedeman & Singleton, Atlanta, Ga., engineers, for a sewage disposal plant costing about $300,000.

## GEORGIA

SAVANNAH, GA.—City has plans by J. E. Sinine Co., Greenville, S. C., for water supply system for domestic and industrial use, to cost about $4 million.

## ILLINOIS

ROCK ISLAND, ILL.—J. I. Case Co. will start work soon on a $1,500,000 plant addition. one story, 200 x 260 feet. Completion is scheduled for Oct. 1.

TUSCOLA, ILL.—Panhandle Eastern Pipe Line Co., Box 148, Stinnett, Tex., has plans under way for two 1600-horsepower gas compressor stations to cost about $200,000.

## INDIANA

CONNERSVILLE, IND.—Connersville water department is having plans made for a water softening plant to cost about $175,000.

VINCENNES, IND.—Board of public works has plans by Henry Steeg & Associates, 129 East Market St., Indianapolis, for a sewage treatment plant and sewer system, estimated to cost about $600,000.

## MICHIGAN

BAY CITY, MICH.—Schepper Copper & Sheet Metal Co., 221 South Water St., has been incorporated with $50,000 capital to manufacture copper and sheet metal, by George Fegert, 507 West Midland Ave.

DETROIT—Pohl Tool Co., 8930 Tireman Ave., has been incorporated with $50,000 capital to manufacture high-speed cutting tools, by Adolph Pohl, 7445 Theisen avenue, Dearborn, Mich.

DETROIT—Spline & Gear Machine Co., 19380 Mt. Elliott Ave., has been incorporated with $125,000 capital to manufacture castings, implements, tools and machinery, by Charles E. Sengman, same address.

DETROIT—S. & S. Heating Co., 11550 Twelfth St., has been incorporated with $200,000 capital to manufacture gas conversion burners, by Jack E. Silverston, 18079 Pennington Ave.

DETROIT—Detroit Bronze Bushing Co., 1061 Beaufait Ave., has been incorporated with $50,000 capital to manufacture metal products, by Donald C. Stevenson, same address.

DETROIT—Hydromatic Sterilizers of America Inc., 2567 West Grand Blvd., has been incorporated with $25,000 capital to manufacture automatic dishwashing machinery, by Joseph B. Leonard, same address.

INKSTER, MICH.—Penn Machine Products Inc., 25910 Michigan Ave., has been incorporated with $50,000 capital to manufacture tools and dies, by Myron Georgia, 300 Reginald St., Dearborn, Mich.

KALAMAZOO, MICH.—Bowers Tool & Die Co., 610 West Willard St., has been incorporated with $250,000 capital to do tool and die work, by Ernest C. Bowers Sr., same address.

LANSING, MICH. — Commercial Tabulating Service Inc., 132 West Ionia St., has been incorporated with $50,000 capital to manufacture machinery, equipment and supplies, by Ray C. Lynn, same address.

## MISSISSIPPI

HEIDELBERG, MISS.—United Oil Producers Inc., Gary, Ind., C. M. Page, president, plans erection of an asphalt plant at Heidelberg.

JACKSON, MISS.—Armstrong Cork Co., Lancaster, Pa., has let contract to Capitol Building Co., Jackson, for an asphalt tile manufacturing plant on highway 80; contract for first unit is at $355,000 and with installation of machinery cost will be $550,000 to $600,000; plant will be 116 x 265 feet, half one-story and remainder three-story.

NATCHEZ, MISS.—Gulf Refining Co., Jackson, Miss., has plans under way for a recycling plant to cost about $6,500,000.

## MISSOURI

DEXTER, MO.—T. J. Ross, mayor, has plans by Russell & Axon, 6635 Delmar Blvd., St. Louis, for a sewage disposal plant, water tank on tower and sewer extensions, to cost about $150,000.

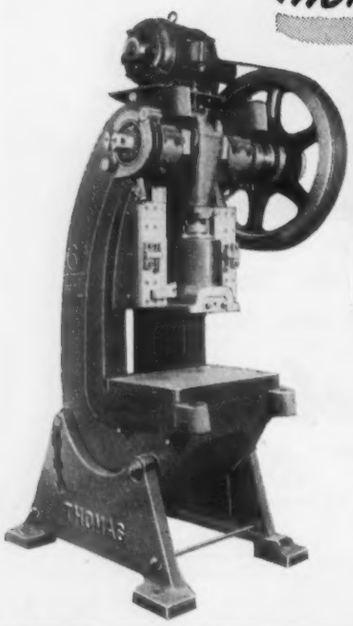
## MONTANA

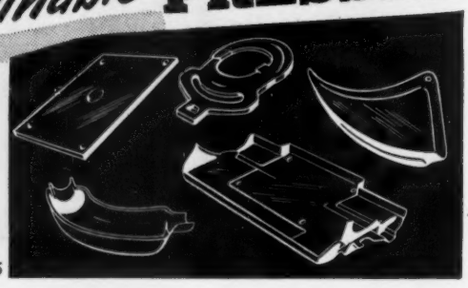
MISSOULA, MONT.—Idaho-Montana Pulp & Paper Co., Missoula, W. F. Emory, president, has let preliminary contracts for a lumber and plywood plant at Polson, Mont., to cost about $600,000. Company also plans early construction of $6 million pulp mill.

## NEW YORK

NEW HYDE PARK, N. Y.—Fahnestock Electric


THOMAS OPEN-BACK Inclinable PRESSES





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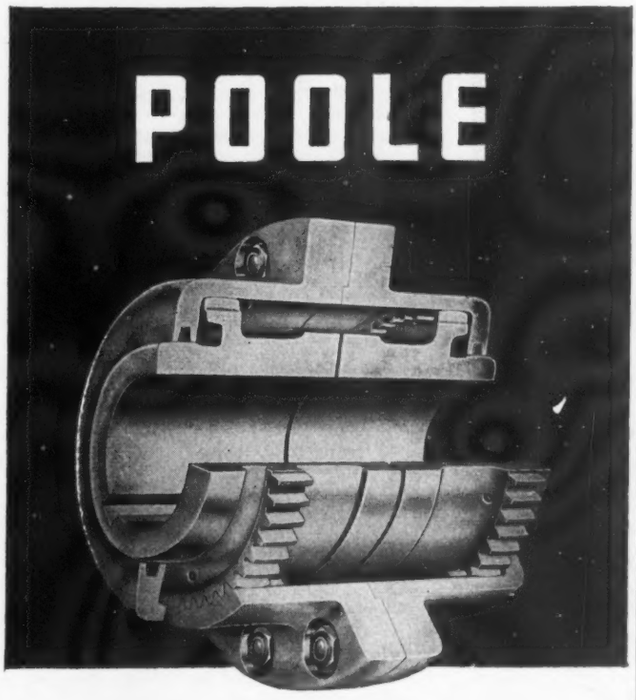

A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

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292 MADISON AVENUE, NEW YORK 17, N.Y.

Co., 46-44 Eleventh St., Long Island City, N. Y., has plans by C. Spindler, 164 Montague St., Brooklyn, N. Y., for a factory and office building to cost about $125,000.

### NORTH CAROLINA

ASHEBORO, N. C.—Town has plans under way by Platt & Davis, engineers, Durham, N. C., for a sewage treatment plant to cost about $430,000 and sewer interceptor line costing $160,000.

### OHIO

AKRON—Ohio Edison Co., W. H. Sammis, president, 47 North Main St., is having plans prepared for a generating plant addition 120 x 200 feet, for 44,000 kw output, to cost about $4 million.

ANTWERP, O.—Village has plans in preparation by Finkbeiner, Pettit & Strout, Home Bank Bldg., Toledo, O., for a water softening plant to cost about $50,000.

ASHTABULA, O.—Ashtabula Electric Products Co. has been incorporated by William R. Kiefer, agent, Williamson Bldg., Cleveland, to manufacture motors, generators, dynamos, fuses and switches.

CLEVELAND—New York Central railroad, West Third St. and St. Clair Ave., is expanding yards on East 152nd St. at cost of about $310,000, including diesel repair shop and various alterations.

CLEVELAND—Acheson Mfg. Co. has been incorporated by Ernest Acheson, president of Cleveland Auto Top & Trim Co., 3507 Carnegie Ave., to develop production of tubular steel tractor tops for protection from weather.

CLEVELAND—Gyro Motors Corp. Inc. has been incorporated Myron N. Kotiger, attorney, 55 Liberty St., New York, with $1000 capital and 750 shares no par value to manufacture motors for automotive, aircraft and marine fields.

CONNEAUT, O.—Perma-Brite Stainless Aluminum Inc. has been incorporated with $100,000 capital by G. A. Peters, 229 Main St., and associates and plans to erect a plant here for manufacture of kitchenware.

ELYRIA, O.—Elyria Truck & Implement Co., 69 East Broad St., has let contract to R. Popp, 321 Gulf Rd., for a one-story plant addition costing about $70,000. M. Hahn, Century Bldg., is architect.

ELYRIA, O.—Elyria Plating Corp., 120 Olive St., will build a plant addition of about 5000 square feet, to cost about $7000.

KENT, O.—Caldwell Industries Inc. has been incorporated to take over business of Caldwell Mfg. Co., 143 Gougler St. Milton F. Caldwell is president. New plant is planned to increase production of baby walkers and some new products. Members of the Fageol family which controls Twin Coach Co., are stockholders and directors of the new company.

MANSFIELD, O.—Empire Steel Corp., Bowman St., is having plans made for a boiler plant to cost about $200,000. Boilers and stokers are already on hand. William Weller is company's chief engineer.

PAINESVILLE, O.—Glenn L. Martin Co., Baltimore, has plans for a $190,000 vinyl resin plant on Fairport-Nursery Rd.

SANDUSKY, O.—Brightman Nut & Mfg. Co., Tiffin Ave., will build a plant addition 75 x 80 feet, to cost about $18,000.

TOLEDO, O.—Doehler-Jarvis Corp., 2100 Smead Ave., has let contract to George W. Lathrop & Sons Inc., 1510 Montcalm St., for plant 194 x 270 feet and 52 x 120 feet, estimated to cost about $500,000.

### OKLAHOMA

POTEAU, OKLA.—City, City Hall, plans a sewage disposal plant costing about $100,000. G. H. Guernsey & Co., Petroleum Bldg., Oklahoma City, Okla., are consulting engineers.

### OREGON

PORTLAND, OREG.—Civilian Production Administration has approved application of Western Electric Supply Co. for a warehouse costing about $125,000.

PORTLAND, OREG.—Flintkote Co. has bought site on NW Front St. from Port of Portland and will build a roof products plant costing about $500,000.

### PENNSYLVANIA

PHILADELPHIA—Exide Battery Co., Indiana Ave. and Seventeenth St., has plans under way by Ballinger Co., 105 South Twelfth St., for a plant building, estimated to cost about $150,000.

### TEXAS

ALAMO, TEX.—City has let contract to Rea & Malloy, Sixteenth St., Corpus Christi, Tex., at $103,764 for a sewage disposal plant, sewer lines and pumping plant. Alfred Tamm, 109 South First St., Harlingen, Tex., is engineer.

CARTHAGE, TEX.—Rogers Lacy & Associates, Longview, Tex., plans a recycling plant with 100 million feet daily capacity, estimated to cost $4,500,000.

FORT WORTH, TEX.—Stanolind Oil & Gas Co., Fair Bldg., plans erection of pressure maintenance facilities for conserving casinghead gas at various points in Texas, at cost of about $2 million each.

MIDLAND, TEX.—Shell Oil Co. Inc., Shell Bldg., Houston, Tex., has plans under way for a natural gasoline plant to cost about $2,500,000.

MIDLAND, TEX.—Frontier Chemical Co., Curtis W. Cannon, vice president and manager, Box 5311, Seagraves, Tex., will build $400,000 plant for production of hydrochloric acid and caustic soda.

### VIRGINIA

MARTINSVILLE, VA.—Kasey Truck Body Co. plans erection of a new plant at Collinsville, Va.

RICHMOND, VA.—City, A. Brackenborough, engineer, City Hall, plans construction of a 30-million gallon water filter plant, to cost about $1,500,000.

### WASHINGTON

SEATTLE—University of Washington regents are considering bids for a proposed $700,000 civil engineering building 70 x 208 feet. John Paul Jones is architect.

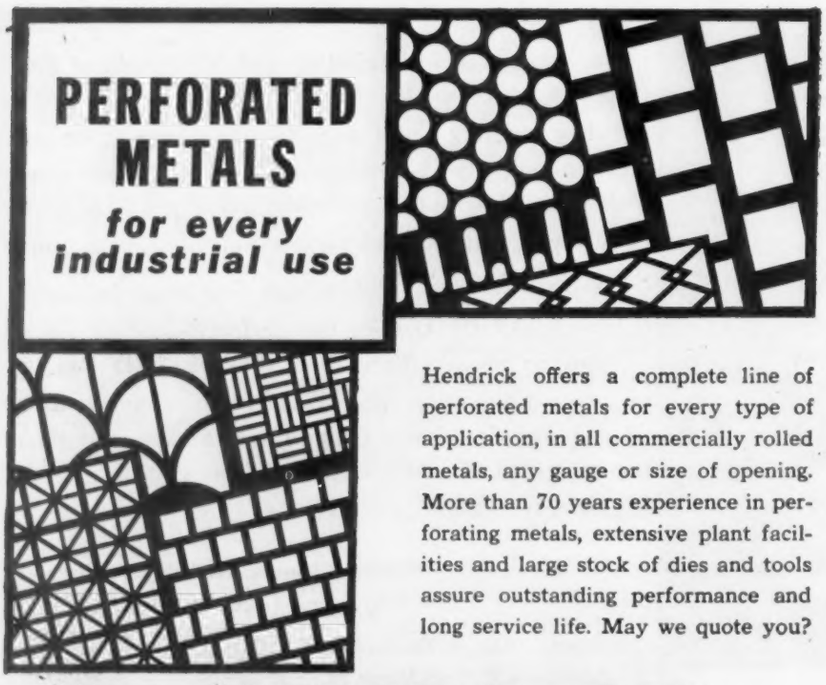
TACOMA, WASH.—Civil Production Administration has approved plans of Hooker Electrochemical Co. for an $85,000 plant extension and of Cellulose Products Co. for a $60,000 factory and warehouse.

TACOMA, WASH.—City council has voted $35,000 for purchase of three sewage pumps, first unit of proposed $3 million system improvements.

### WISCONSIN

BERLIN, WIS.—Berlin Casting Corp. has been incorporated with $4000 capital to manufacture metal castings, by Frank Hunt and associates.

MERRILL, WIS.—Lincoln Foundry Co. has been incorporated with $90,000 capital to do general foundry work, by P. J. Stoesser Sr. and associates.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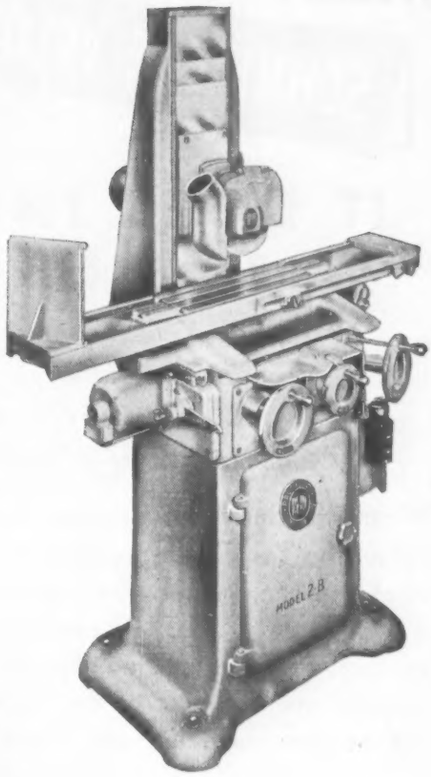


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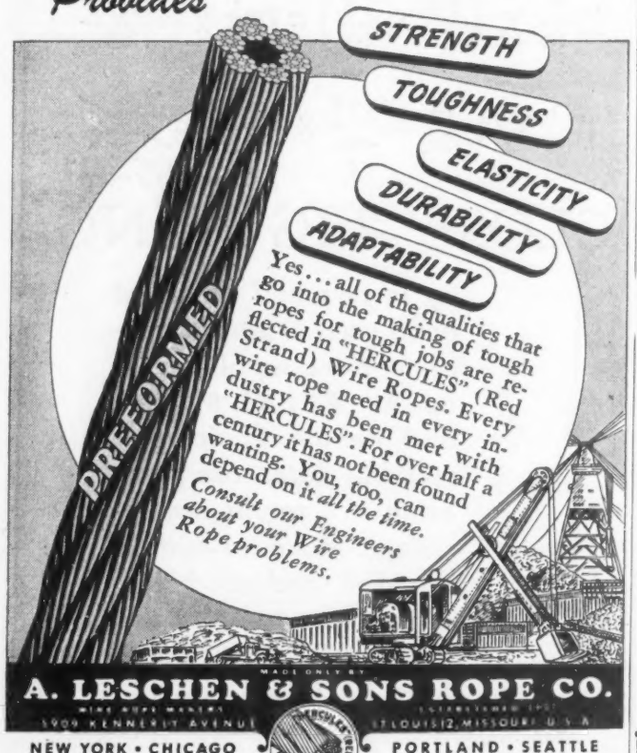
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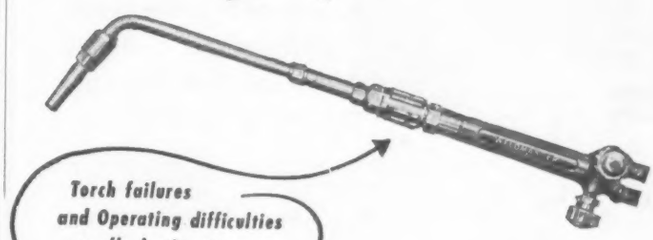

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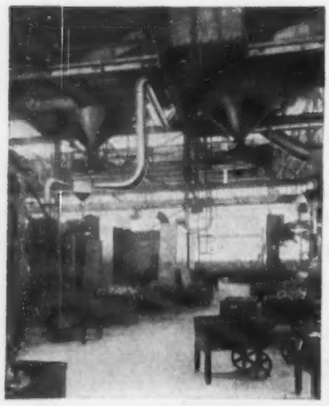
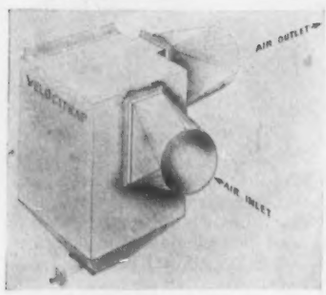
The contaminated air removed by a dust control system is carried through the Velocitrap, where the bulk of the solids, including the heavier particles, are trapped in a dry state; ready to be returned to process.



Abrasive materials, which wear out the elbows of the ducting prematurely, are removed; resulting in longer life for ducting and collectors. Settling out of heavy materials in the duct lines is eliminated.

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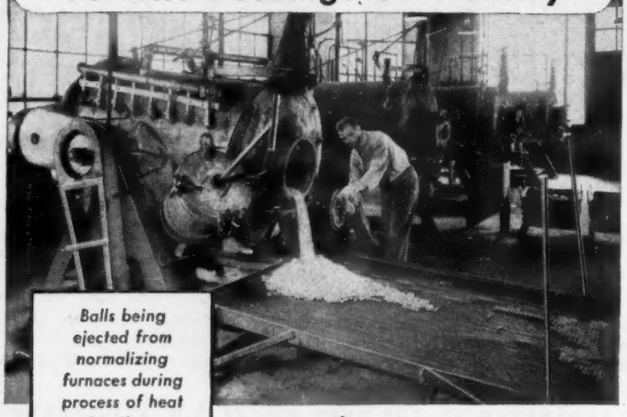

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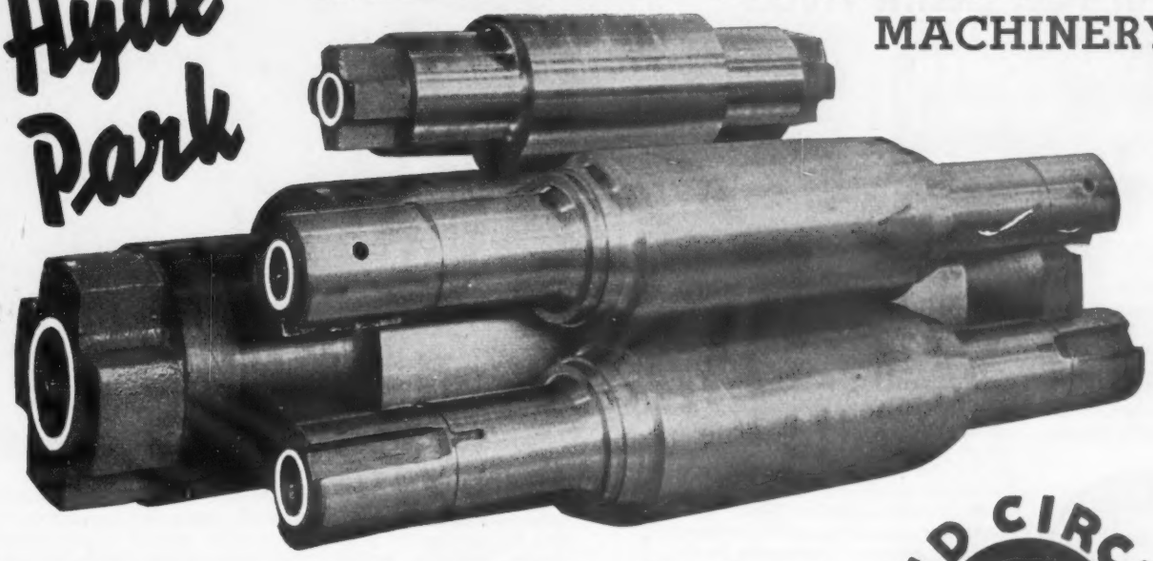

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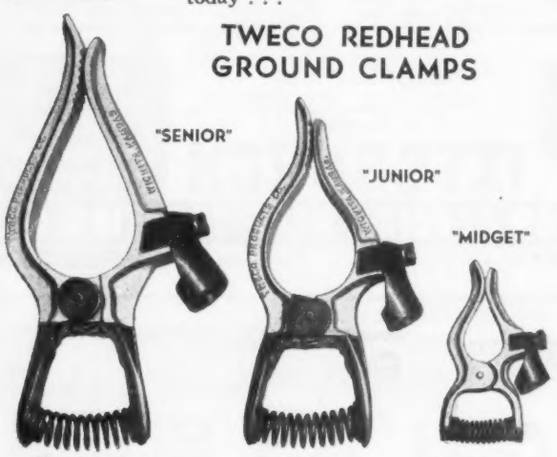


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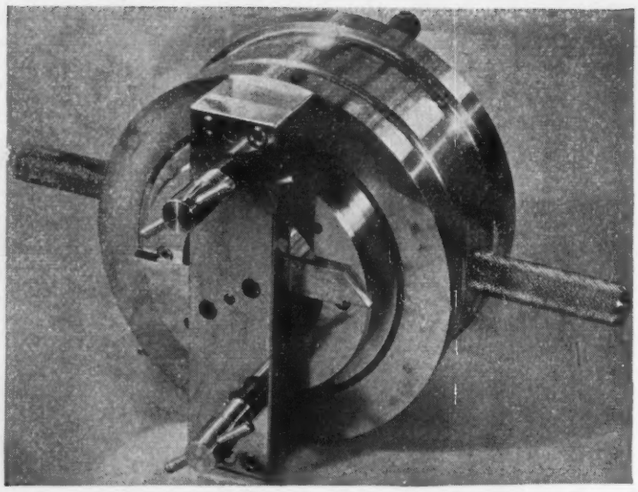

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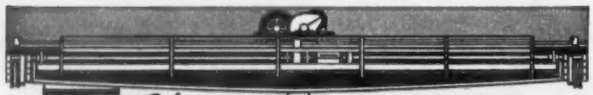

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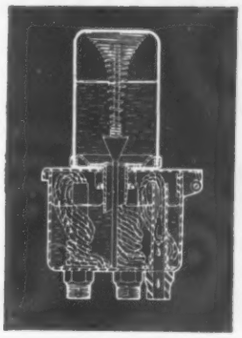

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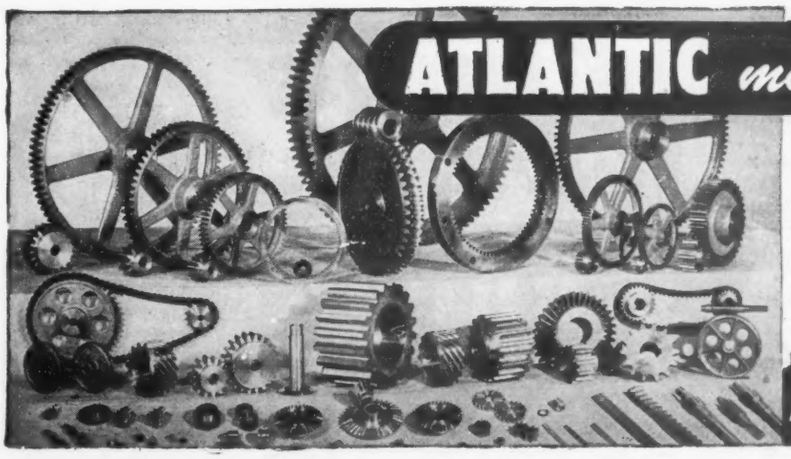

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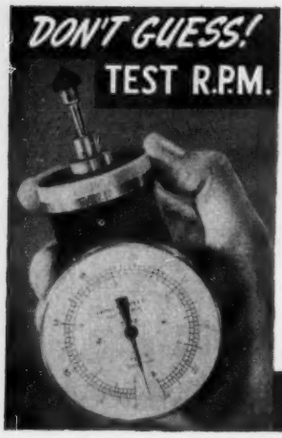

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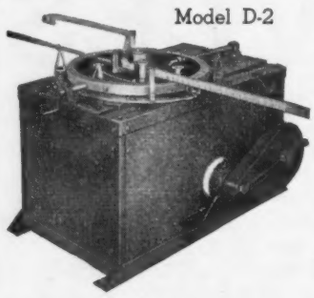

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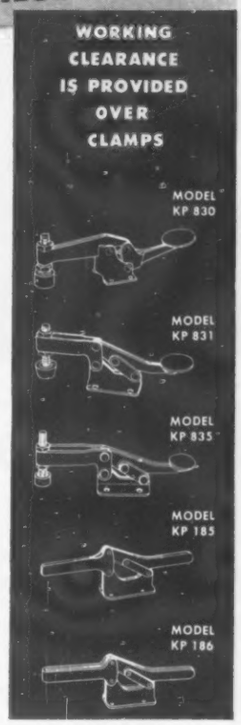


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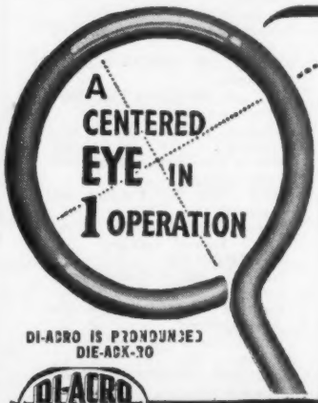


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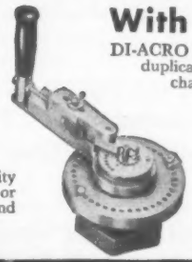

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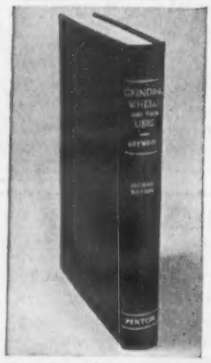

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**F. N. 4 SHEAR**
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## Oportunities


**FOR SALE ?**

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**Elizabeth City, N. C**



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**Metal Specialties comprised of STAMPINGS, FORMING, WELDING, SPINNING, MACHINING. All Metal or Combined with Non-Metal Materials**

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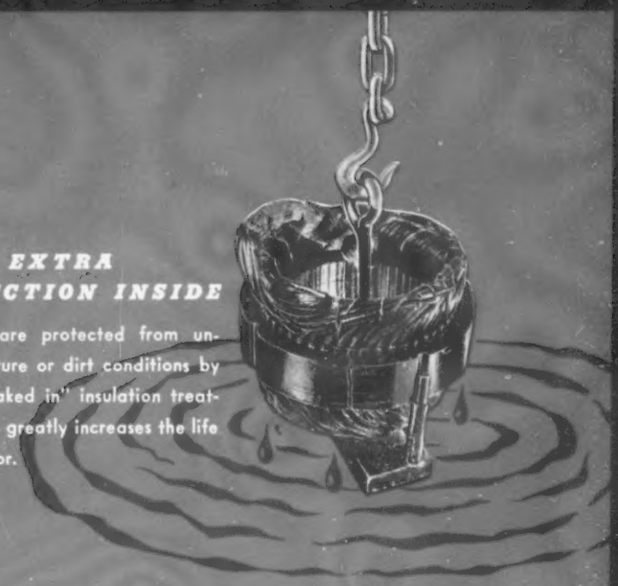
The cast iron frame and end shields are so constructed that the internal working parts of the motor are fully protected from falling dirt or dripping liquids.

### EXTRA PROTECTION INSIDE

Windings are protected from unusual moisture or dirt conditions by special "baked in" insulation treatment which greatly increases the life of the motor.



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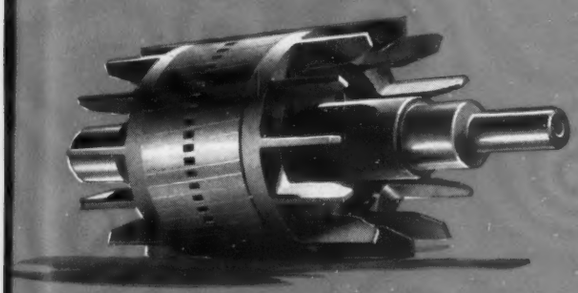
## 1/10 TO 100 HORSEPOWER

**THE MASTER ELECTRIC COMPANY • DAYTON, OHIO**



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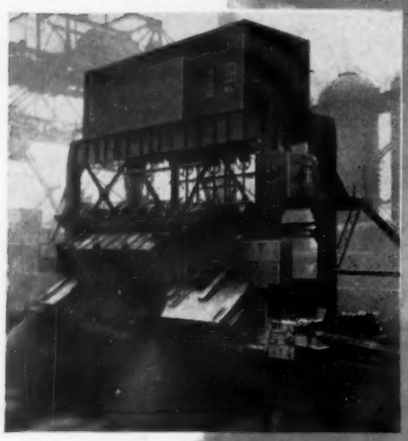
### EXTRA FREEDOM FROM VIBRATION

The rotor of every Master Motor is dynamically balanced to eliminate noise and destructive wear due to vibration from an out-of-balance condition.

# Modern Blast Furnace Equipment

## *uses* TIMKEN BEARINGS



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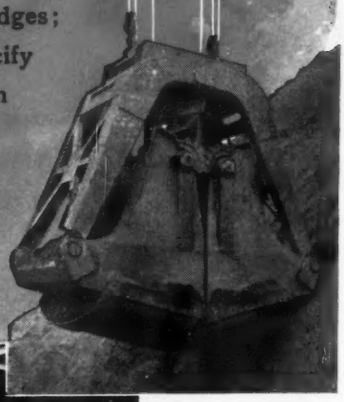
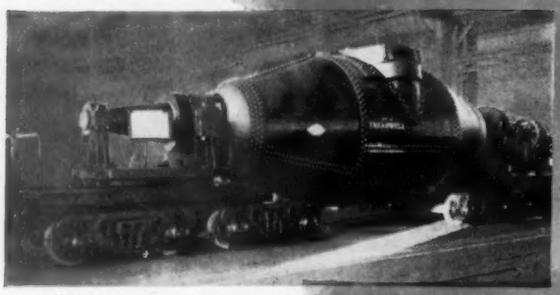
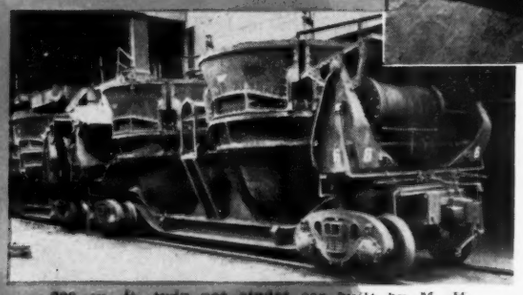
**THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO**



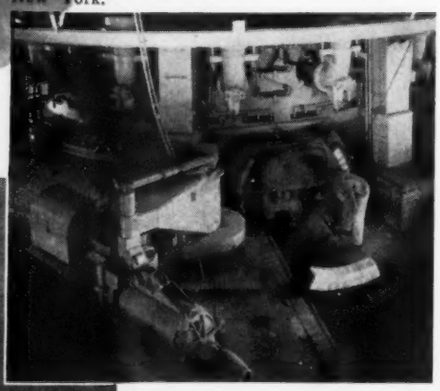
22-25 net ton capacity ore bucket manufactured by Blaw-Knox Co., Pittsburgh, Pa.



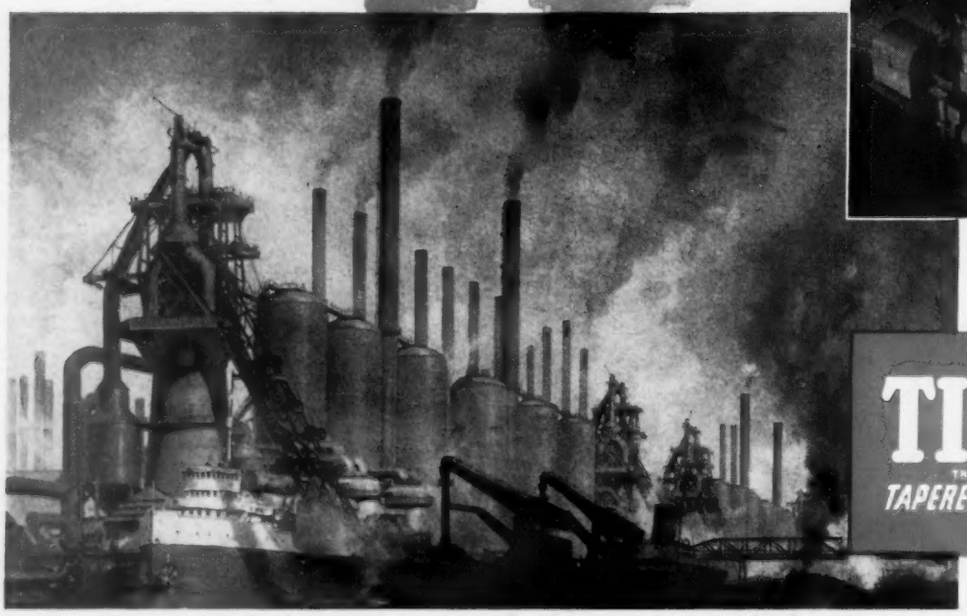
160 ton mixer type hot metal car built by M. H. Treadwell Company, Inc., New York.



800 cu. ft. twin pot cinder car built by M. H. Treadwell Company, Inc., New York.



Pedestal-mounted clay gun manufactured by Edgar E. Brosius Company, Pittsburgh, Pa.



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